# PROGRAMMATIC ENVIRONMENTAL ASSESSMENT For Approving Workover Operations

United States Department of the Interior Bureau of Indian Affairs

> Osage Agency Pawhuska, Oklahoma



## Osage Nation Mineral Reserve

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### Abbreviations and Acronyms

ABB American Burying Beetle
APD Application for Permit to Drill

BGEPA Bald and Golden Eagle Protection Act

BIA Bureau of Indian Affairs
BLM Bureau of Land Management
BMP Best Management Practice

CAA Clean Air Act

CERCLA Comprehensive Environmental Response, Compensation and

Liability Act

CFR Code of Federal Regulations
CIAA Cumulative Impacts Analysis Area

CWA Clean Water Act

EA Environmental Assessment Environmental Justice

EPA U.S. Environmental Protection Agency

ESA Endangered Species Act

FPPA Farmland Protection Policy Act

GHG Greenhouse Gases

HAP Hazardous Air Pollutants

IPaC Information, Planning, and Conservation System

MBTA Migratory Bird Treaty Act

NAAQS National Ambient Air Quality Standards
NEPA National Environmental Policy Act of 1969
NHPA National Historic Preservation Act of 1966
NPDES National Pollution Discharge Elimination System

NRCS Natural Resources Conservation Service

NWI National Wetlands Inventory
OAS Oklahoma Archeological Survey

ODWC Oklahoma Department of Wildlife Conservation
ODEQ Oklahoma Department of Environmental Quality

ONPD Osage Nation Police Department

OSHA Occupational Safety and Health Administration

PHMSA Pipeline and Hazardous Materials Safety Administration

RCRA Resource Conservation and Recovery Act

Reserve Osage Mineral Reserve

ROW Right of Way

SARA Superfund Amendments and Reauthorization Act

THPO Tribal Historic Preservation Officer
USACE United States Army Corps of Engineers
USDA United States Department of Agriculture
USFWS United States Fish and Wildlife Service

VOC Volatile Organic Compound

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#### 1.0 INTRODUCTION

## 1.1 Background

In the 1880s, the Osage Tribe purchased 1,469,077 acres of land from the Cherokee Indians, and this area – now known as Osage County, Oklahoma- became the new homeland of the Osage Nation. The oil, gas, coal, and other minerals covered by this land were reserved to the Osage Tribe for twenty five years pursuant to the Act of June 28, 1906. The term of the reservation of the mineral estate was extended by subsequent Acts of Congress in 1921, 1929 and 1938. Finally, on October 21, 1978, Congress extended Federal trust supervision over the Osage mineral estate in perpetuity. (BIA, 1979) The 1906 Act directed that royalties received from mineral production were to be distributed to the membership of the Osage Tribe in accordance with the legal roll. The heirs of the original members of the Osage Tribe and others entitled to receive annuity payments derived from the Osage Mineral Reserve are often referred to as "Osage headright holders" or "Osage shareholders".

The Osage Minerals Reserve underlies all of Osage County, Oklahoma. (Figures 1-1 and 1-2) The Osage Nation's tribal headquarters, the county seat, and the Osage Agency of the Bureau of Indian Affairs (BIA) are all located in Pawhuska. Much of Osage County is rural and sparsely populated. The population includes a relatively high percentage (14.12%) of Native Americans (mostly Osage) compared to the state average (8.2%). The typical landscape of Osage County is characterized by gently rolling hills of native grassland and woods, used primarily for cattle grazing and dotted with oil and gas wells and associated structures.

The availability of energy resources underlying Osage County, the national demand for energy, and the improvement of petroleum extraction technologies, have all combined to make the Osage Mineral Reserve a valuable asset for the Osage Tribe, Osage headright holders and the local economy. Oil and gas development began in the County in 1896 when the first oil and gas lease was obtained by Edwin B. Foster of Rhode Island. The first producing oil well was brought in on October 28, 1897, and the first oil from the well was sold in May 1900. The entire County has been repetitively leased for mineral development, parts of it more than four or five times, and there are large numbers of active and inactive wells. Osage County is one of the leading oil and gas producing counties in Oklahoma.

### 1.2 Purpose, Need and Decision to be Made

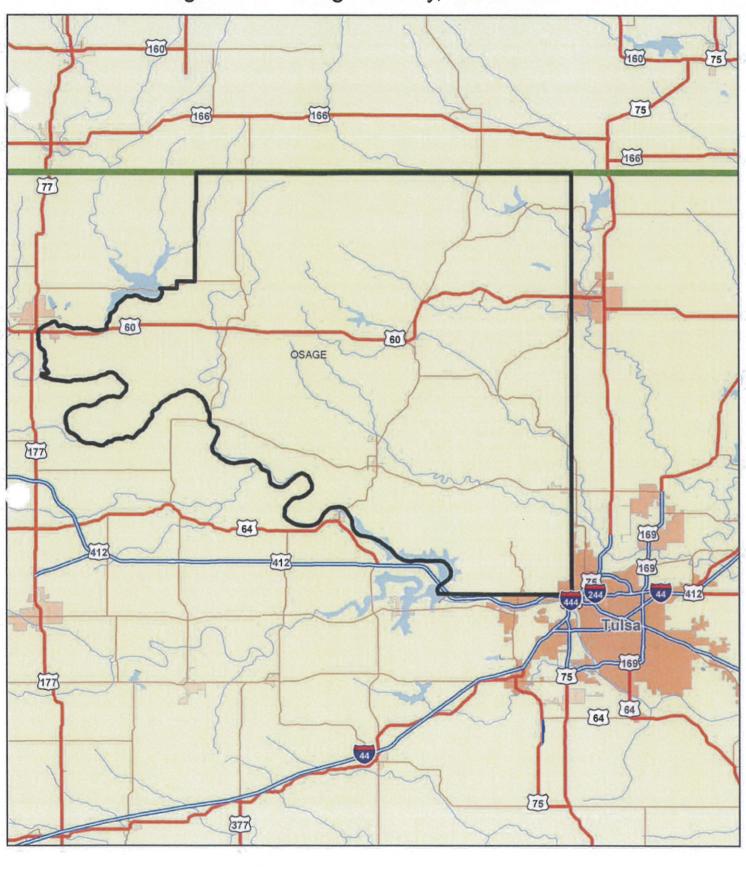
## **Purpose**

The Bureau of Indian Affairs (BIA) Osage Agency is the federal agency responsible for managing the oil and gas development program affecting the Osage Mineral Reserve. The BIA approves leases, approves or denies applications for permits to drill, and approves or denies proposed "workover operations" in accordance with regulations found in 25 CFR Part 226. The purpose of this Programmatic Environmental Assessment (PEA) is to address potential environmental impacts associated with BIA approval to conduct workover operations on existing wells in Osage County, including temporarily abandoned and currently active oil/gas wells and facilities. This PEA will evaluate the following workover operations:

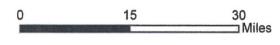
62 Figure 1-1. State of Okla! na and Osage County Oklah That City Amarillo

I SMITH Dallas Metro Area 300 ☐ Miles 150 Abilene Legend
Osage County
OK State Boundary

Figure 1-2. Osage County, Oklahoma









- 1. Re-drilling a previously plugged well
- 2. Deepening an existing well
- 3. Changing to a new formation at a shallower depth
- 4. Any change in casing design:
  - a. Squeeze jobs
  - b. Adding additional perforations
  - c. Running a liner
  - d. Setting bridge plugs/cement retainers
- 5. Converting a well to another use:
  - a. Converting an oil well to a gas well or vice versa
  - b. Converting a producing well to a water injection or salt water disposal (SWD)
- 6. Plugging a well
- 7. Stimulation jobs:
  - a. Fracture treatments
  - b. Acid fracs
  - c. Acid jobs (that are designed to extend past the perforations and into the reservoir)

This PEA for Workover Operations is being prepared to ensure that the Federal obligations of the United States to Federally recognized Tribes are met and that proposed operations are conducted in accordance with Federal laws and regulations that protect, enhance and preserve natural and cultural resources, including, without limitation, applicable provisions of 25 CFR Part 226 and the National Environmental Policy Act of 1969 (NEPA), as amended.

## Need

Workover operations are necessary to increase the productivity and profitability of existing wells and to extend the longevity of well(s). The Osage Tribe and headright holders rely on income generated from the Osage Mineral Reserve that is held in trust pursuant to the "1906 Act". Workover operations are necessary to ensure that the Osage Tribe fully realizes the potential economic benefit of the Osage Mineral Reserve and to accomplish the BIA mission to develop, conserve and preserve Tribal trust assets. Responsible and reasonable development of these mineral resources, done in a manner that complies with applicable laws and regulations, is consistent with the BIA's mission to develop, conserve and preserve Tribal trust assets.

Workover operations are also consistent with the mineral leases previously entered into between various companies and the Osage Minerals Council, and approved by the Superintendent. Over the years, these companies/lessees have made financial investments in the purchase of lease agreements and in the development of associated mineral resources. The completion of various workover operations is often necessary to ensure the continued economic viability of lease operations and prolong the life of the leases. It may also increase the rate of production and profit margin.

### Decision to be Made

This EA analyzes potential impacts to the human environment for:

- 1) The No Action Alternative (described fully in Section 3.1), and
- 2) The Proposed Action (described in detail in Section 3.2) approval of workover operations where there is no new ground disturbance.

If this PEA shows that the Proposed Action will not result in significant adverse environmental consequences, it would result in a Finding of No Significant Impact and a Decision Record (DR) approving workover operations in conformance with this programmatic document. Workover operations would proceed with conditions described in Section 5.0 of this EA. The Lessee/Operator would be required to undertake all workover operations in accordance with the terms and conditions of the DR, leases, regulations and laws.

If this PEA identifies significant adverse impacts as a result of the direct, indirect, or cumulative effects of the Proposed Action, then an environmental impact statement (EIS) must be prepared in order to comply with NEPA. Until such an EIS is prepared, a lessee/operator would have the option to prepare a site-specific environmental assessment covering their proposed workover operation(s).

#### 1.3 Identification of Issues

The BIA did not hold a scoping meeting to identify issues specific to the subject of this EA, but issues have been identified previously in a variety of recent venues. Representatives of the Osage Nation, the Osage Minerals Council, Osage headright holders, Osage Producers, landowners, federal/state agencies and other interested stakeholders identified issues in 2012-2013 during a negotiated rulemaking process concerning revisions of 25 CFR Part 226, which governs oil and gas development of the Osage Minerals Reserve. Other issues were identified by stakeholders during EPA/BIA joint meetings in 2014 concerning an update of a document known as "the Osage Producers Manual". The BIA Osage Agency is also aware of various concerns through its complaint process and tracking system, discussions at regular meetings of the Osage Minerals Council, the Osage Oil and Gas Summit, and through review of comments on NEPA documents such as the 2014 Programmatic Leasing Environmental Assessment.

Some common questions and issues include the following:

- 1. What effect will the proposed action have with regard to impacts to livestock and wildlife due to spills, electric lines, flow lines and disturbance of habitat?
- 2. What effect will the proposed action have regarding potential contamination of watering places for livestock and other surface waters?
- 3. What effect will the proposed action have on water used as drinking water?
- 4. What effect will the proposed action have on known and newly discovered artifacts or areas of cultural, paleontological, and archeological significance?
- 5. What effect will the proposed action have on federally listed endangered or threatened species that have the potential to be located in the proposed project area?

- 6. What impact will the proposed action have with regard to dust, visual impacts, noise and disturbance associated with traffic on access roads?
- 7. What effect will the proposed action have on tribal, state and local economies?

The following resources and components of the affected environment were identified as issues of concern that impacted the analysis of impacts associated with the alternatives described below.

- Land Resources Soil loss, erosion, and geologic impacts to mineral formations.
- Water Resources Increased sedimentation from erosion into surface waters, protection
  of groundwater bearing formations, water use/rights, impacts on streamflow, protection
  of wetlands and cumulative impacts to water quality caused by spill events of brine and
  crude oil through the prolonged operation of oil and gas wells.
- <u>Air Quality</u> Protection of air resources by minimizing fugitive air emissions, and release of hazardous air pollutants.
- <u>Living Resources</u> Ensure that proposed workover operations do not negatively impact threatened and endangered species or their habitat.
- <u>Cultural Resources</u> Ensure that proposed workover operations do not extend beyond the limits of the historically disturbed footprint of the project area in order to protect any nearby cultural resources.
- <u>Socioeconomic Conditions</u> Failure to implement workover operations in the Osage Mineral Reserve would decrease the amount of economic benefit to the shareholders and negatively impact the economy in Osage County.
- Public Health and Safety Failure to implement workover operations in the Reserve
  would increase risk to public health and safety due to improper maintenance of the
  existing facilities and equipment. Possible issues that may arise from lack of workover
  operations could include, but are not limited to the following: improperly plugged or
  unplugged wells that may lead to groundwater contamination, and risk to the public or
  livestock from unplugged well bores or abandoned/unused oil field equipment.

## 2.0 FEDERAL STATUTES, REGULATIONS, AND OTHER AUTHORITIES

Since 1906, the responsibility for management of the oil and gas program affecting the Osage Minerals Reserve has been defined by multiple Federal legislative acts, delegations, and regulations. The Secretary of the Interior, or his authorized representative, is ultimately responsible for approval of leases, permits and related federal actions affecting the Osage Mineral Reserve, but the authority for these actions has been delegated to the Superintendent of the Osage Agency headquartered in Pawhuska, Oklahoma.

Federal actions authorizing mineral extraction must comply with the National Environmental Policy Act of 1969 (NEPA). The Federal involvement with the Osage Nation oil and gas leasing program has been deemed a Federal action requiring compliance with the National Environmental Policy Act (NEPA). Regulations that implement NEPA and are applicable to this EA include 43 CFR Part 46- Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, and 59 Indian Affairs Manual (IAM 3-H), the BIA NEPA Guidebook. (BIA, 2012)

To demonstrate compliance with NEPA and implementing regulations cited above, the BIA must ensure that appropriate analyses of environmental impacts are performed and documented prior to approval of workover operations. This NEPA analysis assists in the development of any appropriate conditions of approval for avoiding, minimizing and mitigating adverse environmental impacts associated with workover operations. The NEPA documents associated with federal actions should outline appropriate conditions of approval that will be binding upon Lessees/Operators. The Lessee/Operators must take appropriate and reasonable actions to avoid, minimize and mitigate unacceptable environmental consequences.

This PEA analyzes potential impacts to the environment and socio-economic resources, known collectively as the human environment. The PEA provides an in-depth analysis of the potential impacts of the proposed BIA federal action on the affected human environment, describes conditions of approval, and lists required best management practices (BMPs).

In addition to NEPA, other federal laws may be applicable, such as:

- Section 7 of the Endangered Species Act (ESA)
- Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470 et seq.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001, et. seq.)
- The federal Clean Air Act (42 U.S.C. §7401 et seq.)
- The Safe Drinking Water Act (42 U.S.C. §300f et seq.)
- The federal Clean Water Act (33 U.S.C. §1251 et seq.)
- Archeological Resources Protection Act (ARPA) (16 U.S.C 470aa-470mm; Public Law 96-95 and amendments to it)

## Regulations include:

- Title 25 of the Code of Federal Regulations (CFR) Part 226- Leasing of Osage Reservations Lands for Oil and Gas Mining.
- Federally approved water quality standards in Chapter 45, Title 785 of the Oklahoma Administrative Code (OAC 785:45). Note: EPA has not approved Oklahoma water quality standards (WQS) for waters located in Indian Country, as defined in 18 U.S.C. § 1151.

Executive Orders and policies that may impact BIA activities related to the proposed action, and the analysis in NEPA documents include, but are not limited to:

- Executive Order 12898 (1994): Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994); 59 FR 7629
- Executive Order 13175 (2000) Consultation and Coordination With Indian Tribal Governments
- Bureau of Indian Affairs Government-to-Government Consultation Policy (2000)

Tribal laws affecting the Osage Mineral Reserve include the Constitution of the Osage Nation, adopted in 2006. Article XV of the Osage Constitution establishes an eight member Osage Minerals Council to oversee the Osage Mineral Reserve. The Osage Minerals Council is elected by Osage headright holders, and plays a critical role in oil and gas development, as described in the Constitution.

#### 3.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

NEPA requires federal agencies such as BIA to "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources..." (NEPA Sec 102[2][e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. For this PEA, the BIA will study and develop a "No Action Alternative" as well as a "Proposed Action Alternative".

#### 3.1 Alternative A – The No Action Alternative

Under the No Action Alternative, workover operations will not be approved without site-specific NEPA. There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Surface disturbance, deposition of potentially harmful biological material, and traffic levels would not change from present levels. Under the No Action Alternative, the Osage Tribe, headright holders, and others would not have the opportunity to realize potential financial gains from the further development of resources at these well locations. Under this alternative, negative impacts may potentially occur, such as increased risk of groundwater and aquifer contamination, inadequate maintenance activities, casing leaks causing an unknown amount of oil, natural gas, or other contaminants to impact multiple components of the affected environment. Socioeconomic impacts may also occur due to the loss of royalties.

Under the No Action Alternative, oil and gas activities associated with production and maintenance of existing wells would continue, unless that activity requires BIA approval. The lessees, operators and contractors associated with well services industries will continue to utilize existing access roads, utility easements and pipelines. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the leased lands, "subject to the terms and conditions incorporated in the lease."

### 3.2 Alternative B – The Proposed Action

Alternative B, the Proposed Action, would be to approve workover operations on existing wells in the Osage Mineral Reserve where there is no new ground disturbance. The following describes potential workover activities associated with the operation and maintenance of existing permitted and operating wells in Osage County. In accordance with 25 CFR Part 226.16, the following activities cannot be permitted unless the tract of land has an approved oil and/or gas mining lease approved by the BIA Osage Agency.

- Acid Fracture (Frac) A well-stimulation operation in which acid, usually hydrochloric (HCl), is injected into a carbonate formation at a pressure above the formation-fracturing pressure.
- Acid Job The treatment of a reservoir formation with a stimulation fluid containing a reactive acid.

- Adding of Perforations Creation of additional communication tunnels that are created from the casing or liner into the reservoir formation, through which oil or gas is produced.
- Cement Retainer An isolation tool set in the casing or liner that enables treatments to be applied to a lower interval while providing isolation from the annulus above.
- Deepening To extend a well bore to a deeper geologic zone for production purposes.
- Well Conversion Oil/Gas to Salt Water Injection/Disposal (SWD) The act of
  converting an existing oil and/or gas well to inject or dispose of water in an underground
  reservoir. This type of action requires permit approval from both the Bureau of Indian
  Affairs as well as the Environmental Protection Agency.
- Well Conversion Gas to Oil To make previous gas production well a primary production crude oil well.
- Well Conversion Oil to Gas To make previous oil production well a primary production natural gas well.
- Plugging and Abandonment To prepare a wellbore to be shut-in and permanently isolated. This process typically requires protection of the freshwater strata through the use of cement plugs which are pressure-tested to confirm hydraulic isolation throughout the well bore, ensuring that the aquifers are protected.
- Redrilling a previously plugged well- To enter and redrill the bore by drilling the cement out of a hole. Most commonly refers to drilling a bridge plug out
- Running a Liner- A technique that minimizes formation damage and gives the ability to control sand.
- Setting Bridge Plug- A downhole tool that is located and set to isolate the lower part of the wellbore.
- Squeeze Job The process of injecting cement slurry into a zone, generally for pressure-isolation purposes and to repair leaks in the casing of a well bore.

Between 2005 and 2014 on an annual basis Osage Agency has processed on average 562 permits. These permits range from drilling a new well (APD), work over procedures, treatments, and conversion from one type of well to another (oil to gas, or gas to oil) producer.

The BIA proposes to approve workover operations within the Osage Mineral Reserve. To perform the above described activities, the Lessee/Operator must submit an Osage Form 139 and other appropriate information to BIA.

#### 3.2.1 Well Pad and Infrastructure Locations

Workover operations must be confined to the footprint of the historical well pad in order to minimize impacts to the various components of the affected environment. Of particular concern are potential impacts to cultural and biological resources if the proposed workover operation extends beyond the existing footprint of the original well pad. The lessee/operator will be required to submit before and after pictures of the well pad to demonstrate that no new ground disturbance occurred during the workover. Failure to confine workover operations to the existing well pad footprint may result in a violation of the oil/gas lease and possible termination and/or additional regulatory actions, fines or criminal penalties for violation of various federal laws, including but not limited to the Endangered Species Act, NHPA, Archeological Resources Protection Act, Clean Water Act, and Clean Air Act.

### 3.2.2 Well Pads

The well pads where proposed workover operations will occur will most likely include a leveled area (pad) that was used for the original drilling rig and other operation and maintenance equipment. The original well pad was stripped of topsoil and vegetation and then graded. The topsoil was most likely stockpiled and stabilized with native grasses until it could be used to reclaim and revegetate the disturbed area during final reclamation of the site. The best management practices (BMPs) described in Section 5.0 must be utilized for erosion control associated with workover operations.

#### 3.2.3 Interim Reclamation

The lessee must perform reclamation over the life of each well pad and must include the return of topsoil, and contouring and seeding of native vegetation. Interim reclamation would be required following any maintenance work or additions of infrastructure. Reclamation would be required before final abandonment of the decommissioned well pad. A successful reclamation would at all times be the responsibility of the lessee/operator.

The Lessee/Operator must control any noxious weeds within the project area and other applicable facilities by approved chemical or mechanical methods, according to standards developed by the BIA to treat known or likely to occur noxious weed species. If seeding of the area does not occur due to growing season constraints, the Applicant would deploy hay across the entire disturbed area to reduce the potential for excessive erosion as a result of precipitation.

The entire project area shall be monitored for erosion, subsidence, and noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the BIA feels the area is successfully reclaimed. Reclamation is considered successful when:

- seeded areas are established:
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

If the new seeding is not successful after two growing seasons, the BIA may require additional efforts to establish vegetation.

#### 3.2.4 Final Reclamation and Abandonment

Final reclamation would occur when each well pad is decommissioned. All disturbed areas would be reclaimed, reflecting the BIA's view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities, with the exception of buried electrical, fiber optic, and pipelines would be removed. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and seeded when appropriate. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. All decommissioned pipelines would be purged of remaining product, capped, and abandoned in place. Buried electrical lines would be disconnected from the active power source and abandoned in place.

#### 4.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The broad definition of NEPA leads to the consideration of the following critical elements of the human and natural environments: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and Environmental Justice (EJ).

Under the No Action Alternative, any impacts due to present levels of surface disturbance, oil and gas operations, access roads and traffic can be expected to continue. No new impacts to the critical elements listed in the paragraph above will result from the No Action Alternative. Existing oil and gas leases would remain in effect so long as production from existing wells continues in paying quantities.

#### 4.1 Land Resources

Osage County is the largest of 77 counties in Oklahoma, encompassing a total of 1,476,480 acres. It is located in the northeastern portion of the State and is border by Kansas on the north, the Arkansas River on the southwest, Tulsa County on the southeast, and Washington County on the east. Except for large flood plains along the Arkansas River and several other major streams, the topography of the county is characterized by gently rolling hills. These hills are generally covered by rock outcrops, native grassland and woodlands, and they are used primarily for cattle grazing.

Osage County is within the Central Lowlands physiographic province on the Oklahoma Platform that dips gently to the west. The Oklahoma Platform is a region of mid-continental Paleozoic rocks on the Ozark Uplift. Bedrock formations are typically intermixed with layers of sandstone, shale and thin limestone and outcrops. .

The Proposed Action is in the general area of the Upper Pennsylvanian and Lower Permian age structures. The proposed well drilling corridor is characterized by gently rolling to rocky hills dissected by lowland areas coursed by tributaries to the Arkansas River.

#### 4.1.1 Physiography and Topography

Osage County is situated in the Interior Plains division of the Central Lowlands physiographic province. The northwestern part of the County is in the Northern Limestone Cuesta Plains

subdivision while the southeastern portion is in the Eastern Cuesta Plains subdivision. The average elevation in the county is about 860 feet, and ranges from a maximum of 1,407 feet at one point a few miles northeast of Foraker to around 590 feet. Most slopes are in the range of 0 to 15 percent.

## 4.1.2 Geologic Setting and Mineral Resources

Osage County is situated in a region of mid-continental Paleozoic rocks on the western flank of the Ozark Uplift. Structurally, the entire area is part of a regional homocline which dips gently to the west. Bedrock formations are typically intermixed sequences of sandstone, shale and thin limestones in the eastern two-thirds of the county. For the most part, the entire county is considered to be an outcrop of Upper Pennsylvanian aged structures. However, rocks of Lower Permian age produce outcrops in a few extreme western areas of the county.

The first well of significance was drilled in 1897 near the Eastern boundary of the County to a depth of 1,349 feet into Sand strata now known as the "Bartlesville Sand." Within 6 years, 30 more wells were drilled, and by 1920 the Burbank Field had been discovered. More than 25,000 oil and gas wells, owned by more than 1,000 oil companies, have been drilled in Osage County

Oil and gas production in the county comes mainly from formations at depths between 200 and 3,000 feet. The Burbank Sand, Bartlesville Sand, Oswego Lime, Arbuckle Sand and Mississippi Chat are among the formations from which oil and gas have been produced. In general, production comes from shallow formations in the eastern portion of the county and from deeper formations to the west.

## 4.1.3 Potential Land Resource Impacts

Implementation of the best management practices included as conditions of approval for workover operations described in the "Proposed Action Alternative" section will reduce potential impacts to land resources below the level of significance threshold and would not require the preparation of an environmental impact statement.

## 4.2 Air Quality

### 4.2.1 Air Quality Standards and Criteria Pollutants

The Clean Air Act (CAA) of 1970 requires that states adopt ambient air quality standards. The CAA (42 USC 7401 et seq.) establishes ambient air quality standards, permit requirements for both stationary and mobile sources, and standards for acid deposition and stratospheric ozone (O<sub>3</sub>) protection. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. Under the CAA, the U.S. Environmental Protection Agency (USEPA) establishes primary and secondary air quality standards. Primary air quality standards protect public health, including the health of "sensitive populations, such as people with asthma, children, and other adults." Secondary air quality standards protect public welfare by promoting ecosystem health, and preventing decreased visibility and damage to crops and buildings.

USEPA has set National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: O<sub>3</sub>, particulate matter (PM<sub>2.5</sub>, PM<sub>10</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and lead (Pb). Greenhouse gasses (GHG), water vapor, carbon dioxide, methane, nitrous oxide, and O<sub>3</sub> are also regulated and have been linked to global climate change.

Criteria pollutants and their health effects include the following.

- SO<sub>2</sub>: SO<sub>2</sub> is a colorless gas with a strong, suffocating odor. SO<sub>2</sub> is produced by burning coal, fuel oil, and diesel fuel, and can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. SO<sub>2</sub> emissions are also a primary cause of acid rain and plant damage (EPA 2012a).
- Inhalable PM (PM<sub>10</sub> and PM<sub>2.5</sub>): PM<sub>10</sub> and PM<sub>2.5</sub> are classes of compounds that can lodge deep in the lungs, causing adverse health problems, depending on their size, concentration, and content. Based on extensive health studies, particulate matter is regulated under two classes. PM<sub>10</sub> is the fraction of total particulate matter 10 microns or smaller, and PM<sub>2.5</sub> is two and a half microns or smaller. Inhalable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter (EPA 2012a).
- NO<sub>2</sub>: NO<sub>2</sub> is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, NO<sub>2</sub> is a major component of photochemical smog. NO<sub>2</sub> is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO<sub>2</sub> is also involved in ozone smog production (EPA 2012a).
- O<sub>3</sub>: O<sub>3</sub> is a colorless gas with a pungent, irritating odor and creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Health effects related to O<sub>3</sub> can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. O<sub>3</sub> can persist for many days after formation and travel several hundred miles (EPA 2012a).
- CO: CO is a colorless, odorless gas that is a byproduct of incomplete combustion. CO concentrations typically peak nearest a source, such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. CO is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness (EPA 2012a).
- CH<sub>4</sub>: Methane (CH<sub>4</sub>) is the second most prevalent greenhouse gas emitted in the United States from human activities. In 2012, CH<sub>4</sub> accounted for about 9% of all U.S.

greenhouse gas emissions from human activities. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. Natural processes in soil and chemical reactions in the atmosphere help remove CH<sub>4</sub> from the atmosphere. Methane's lifetime in the atmosphere is much shorter than carbon dioxide (CO<sub>2</sub>), but CH<sub>4</sub> is more efficient at trapping radiation than CO<sub>2</sub>. Pound for pound, the comparative impact of CH<sub>4</sub> on climate change is over 20 times greater than CO<sub>2</sub> over a 100-year period.

According to the USEPA, no counties in Oklahoma are classified as nonattainment areas for criteria pollutants (USEPA 2011). No air quality monitoring stations in Osage County were identified (ODEQ 2012). Southerly winds prevail for most of the year in the area with the exception of winter when northerly winds are associated with weather events (OCS 2012). Osage County, given its rural nature, maintains good air quality and visibility throughout the year.

Refer to Appendix B for a more thorough summary of typical air emissions related to oil field development, greenhouse gas emissions, climate change, and hazardous air pollutants.

## 4.2.2 Potential Air Resource Impacts

Based on the existing air quality of Osage County, typical air levels and types of emissions from similar oil field projects, the Proposed Action would not produce significant increases in criteria pollutants, GHGs or HAPs. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and therefore would be localized, largely temporary, and limited in comparison with regional emissions. The Proposed Action is not expected to impact attainment status based on any of the Primary and Secondary National Ambient Air Quality Standards for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

#### 4.3 Water Resources

This section identifies the existing water resources within the project area and potential effects of the Proposed Action. Specific subjects discussed in this section include surface water and surface water quality, groundwater resources, and the potential short-term and long-term impacts of the Proposed Action on these water resources.

#### 4.3.1 Ground Water

The major groundwater basin in Osage County is the Vamoosa Aquifer which measures approximately four to nine miles across Osage County. It is composed of inter-bedded sandstone, shale and conglomerate. The formation ranges from about 300 to more than 630 feet thick. The large amount of shale in northern portions of the Vamoosa limits well yields to about 60 gallons per minute. Alluvium quaternary deposits (stream-laid deposits of inter-fingering sand, silt and clay) are the most productive deposits and occur within a one to six mile stretch along the Arkansas River.

#### 4.3.2 Surface Water

The average annual precipitation for Osage County ranges from 32 to 38 inches. Moderate rainfall and hilly topography allow for perennial, intermittent and ephemeral stream flows. Streams generally drain to the Arkansas River and Caney River, a main tributary of the Arkansas River. Area lakes provide water storage for public drinking water supplies to nearby towns and rural water systems. In addition to area lakes, water supplies for wildlife and livestock include numerous farm ponds, watershed projects, streams and creeks.

Surface water resources in the Proposed Action area must be managed and protected according to existing federal laws and regulations during both construction and continued operations of the project. Surface water protection is primarily regulated the federal Clean Water Act of 1972, as amended (33 USC 1251 et seq.) and the Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.). Under the Clean Water Act, states and tribes may establish and seek federal approval of water quality standards for surface waters. Federally approved WQS for surface waters in the areas affected by the Proposed Action are found in Chapter 45, Title 785 of the Oklahoma Administrative Code (OAC). Waters affected by the Proposed Action are included in Water Quality Basin Numbers 1 and 6.

Most major streams and lakes in the affected area of Osage County have designated beneficial uses that include Primary Body Contact Recreation, Public and Private Water Supply, Warm Water Aquatic Habitat, and some are listed as Sensitive Water Supplies. Each of these beneficial uses has numeric and/or narrative criteria listed in the WQS for the purpose of protecting the beneficial, such prohibition of oily sheen, limits on discharges, limits on bacteria concentrations, minimum dissolved oxygen criteria and numeric criteria for toxic pollutants). In addition, some waters, such as sensitive public and private water supplies ("SWS"), are protected by special provisions (See Appendix F). SWS protections (no new point source discharge and no increased loading) apply to Fairfax City Lake, Phillips Lake (Shidler), Hominy Creek upstream from and including Skiatook Lake, Hominy Municipal Lake, Pecan Hollow Creek, Birch Reservoir, and Bluestem Lake, and watersheds of these lakes.

Many waterbodies in Osage County have been assessed to determine whether they are meeting applicable water quality standards. Waters in Osage County that do not currently meet applicable water quality standards are listed in the 2012 List of Impaired Waters compiled by the state of Oklahoma under Section 303(d) of the Clean Water Act. A total of nineteen (19) Osage lakes and streams are on the list of impaired waters (See impaired streams indicated as "red" on the Map of Impaired Streams in Appendix F). One source of impairment for six (6) of 19 impaired streams and lakes in Osage County is listed as Source ID number 102-"petroleum/natural gas activities (Legacy)". Other sources of impairment vary, and include agriculture, grazing, point sources and unknown sources. Special care must be taken to prevent new or increased contributions of pollutants from sources of impairment to streams on the 303(d) list.

<sup>&</sup>lt;sup>1</sup> Impaired waters on the 303d list with a source code of "102" (petroleum/natural gas activities) include Hominy Creek (chloride and TDS), Bird Creek (oil and grease), Mill Creek, Coal Creek, Flat Rock Creek and Delaware Creek and another segment of Bird Creek. Impaired uses include agriculture (Hominy Creek), public and private water supply (Bird Creek) and Fish and Wildlife Propagation (Mill, Coal, Flat Rock, Delaware and a segment of Bird Creek)

The Clean Water Act regulates point source discharges of pollutants into waters of the United States. Such discharges are prohibited, unless a permit has first been obtained through the National Pollutant Discharge Elimination System (NPDES) program. In Osage County, the U.S. Environmental Protection Agency Region 6 (Dallas) office is responsible for issuance of NPDES permits related to oil and gas development activities. Nonpoint source pollution from contaminated stormwater runoff should also be avoided.

Under the Proposed Action, workover activities must be engineered and constructed to: (1) avoid stormwater contact with pollutants and contaminants, including but not limited to brine, oil residues and sediments, (2) minimize the amount of suspended sediment (i.e., turbidity) and the concentration of contaminants in any runoff or discharges, and (3) avoid alteration of natural drainages. Compliance with applicable federal water quality standards is required at all times. No surface water may be converted for use as a lagoon or pit. Any chemicals or potentially hazardous materials must be handled in accordance with the operator's spill prevention, control, and countermeasure plan (SPCC Plan). The relative site specific SPCC plan must be designed to minimize potential impacts to any surface waters associated with an accidental spill. In accordance with 40 CFR Part 112.3(e)(2), the operator must have applicable SPCC plans available for public review upon request.

## 4.3.3 Hydraulic Fracturing Process

Hydraulic Fracturing (HF) is a well stimulation process used to maximize the extraction of oil and gas. The process enhances subsurface fracture systems, allowing oil to move more freely through porous rock to production wells that bring the oil or gas to the surface (EPA 2013b). During HF, fluids, commonly comprised of water and chemical additives, are pumped down the well bore into these target formations at high pressure. The HF process uses large volumes of water under high pressure to fracture rock within the target formation to increase formation porosity and allow the flow of petroleum from the rock. Depending upon the characteristics of the well and the rock being fractured, a few million gallons of water can be required to complete a job (Arthur et al. 2008).

Only specific sections of the well within the target formation receive the full force of pumping. As pressure builds up in this portion of the well, water opens fractures, and the driving pressure extends the fractures deep into the rock unit. When pumping stops, these fractures quickly snap closed and the water used to open them is pushed back into the borehole, back up the well and is collected at the surface. The water returned to the surface is comprised of injected water mixed with the pore water that has been trapped in the rock unit for millions of years. The pore water is usually a brine with significant amounts of dissolved solids (Arthur et al. 2008).

When the pressure exceeds the rock strength, the fluids open or enlarge fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After HF is completed, the internal pressure of the geologic formation causes the injected HF fluids to rise to the surface where they are stored in disposal tanks (EPA 2013b).

Proppants are small compression-resistant particles added to the HF fluids to assist in holding the fractures open and creating pore space through which petroleum can flow. Sand was the original

proppant but now aluminum beads, ceramic beads, sintered aluminum (i.e., bauxite), and other materials are being used in the wells. Over one million pounds of proppants can be used during HF of a single well (Arthur et al. 2008).

In addition to proppants, a variety of chemical additives are included with the water used in HF. Some chemicals are used to thicken the water into a gel that is more effective at opening fractures and carrying proppants deep into the rock unit. Other chemicals are added to reduce friction, keep rock debris suspended in the liquid, prevent corrosion of equipment, kill bacteria, control pH, and other functions (Arthur et al. 2008). Typical chemical additives used in the HF fluids are listed in Table 4-2.

Table 4-2. Common Additives of Hydraulic Fracturing Fluid.

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic	Swimming pool chemical and cleaner
5770 191	acid	
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion	N,n-dimethyl formamide	Used as a crystallization medium in
inhibitor		pharmaceutical industry
Friction reducer	Petroleum distillate	Cosmetics including hair, make-up,
		nail, and skin products
Gel	Guar gum or hydroxyethyl	Thickener used in cosmetics, sauces,
	cellulose	and salad dressings
Iron control	2-hydroxy-1,2,3-	Citric acid is used to remove lime
	propanetricaboxylic acid	deposits; lemon juice ~7% citric acid
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand or clay beads	Play sand (seldom used)
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing
		agent

Source: Arthur et al. 2008.

#### 4.3.4 Potential Impacts to Surface Water and Groundwater Resources

Best management practices described in Section 5.0 of this EA are conditions of approval for the proposed workover operations. These conditions of approval will reduce potential impacts to water resources below the level of significance threshold and, therefore, the preparation of an environmental impact statement is not required.

The proposed conversion of a saltwater injection or disposal well by the Lessee/Operator would require approval from both the BIA and the EPA. EPA analyzes proposed saltwater injection or disposal wells for compliance with the Safe Drinking Water Act implementing regulations. EPA's analysis will result in appropriate conditions to ensure protection of freshwater aquifers and other important groundwater resources. BIA may impose site-specific permit conditions

and/or set location restrictions for saltwater injection or disposal to address factors not considered by EPA's analysis. For example, BIA may establish permit conditions to ensure that BIA permitted activities do not contribute to a violation of federally approved surface water quality standards. In situations where additional site-specific BMPs are required an additional project-specific EA may be required.

According to the U.S. Geological Survey, "...some surface-water samples collected in the Osage Nation contained dissolved chloride concentrations exceeding the secondary drinking-water standard of 250 mg/L, with greater chloride concentrations in selected basins appearing to be associated with greater densities of petroleum well locations." See, U.S.G.S. 2014. "Description of Landscape Features, Summary of Existing Hydrologic Data, and Identification of Data Gaps for the Osage Nation, Northeastern Oklahoma, 1890-2012." In one area of Osage County (the watershed of Hominy Creek and Little Hominy Creek), chloride from groundwater seeps appears to be contributing to impairment of surface water quality. See, U.S.G.S. 2014, and the 2012 Oklahoma Integrated Report, which includes the 303d list of impaired waters at http://www.deq.state.ok.us/WQDNew/305b 303d/index.html.

Oil-bearing formations typically occur much deeper than potable water aquifers. However, since the introduction of technological advances in hydraulic fracturing (HF), some environmental concerns have been published related to the use of chemical additives and their potential effect on groundwater resources. These concerns, reviewed in Arthur et al. (2008), include the following:

- Fractures produced in the well might extend directly into shallow rock units that are used for drinking water supplies, or fractures produced in the well might communicate with natural fractures that extend into shallow rock units that are used for drinking water supplies.
- 2. The casing of a well might fail and allow fluids to escape into shallow rock units used for drinking water supplies.
- 3. Accidental spills of HF fluids or fluids expelled during HF might seep into the ground or contaminate surface water.

The EPA studied the effects of coalbed methane well fracturing and published the results in a 2004 report entitled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 816-R-04-003) (EPA 2004). The report has received both internal and external peer review, and public comment on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of HF fluid contaminating underground sources of drinking water during HF of coalbed methane production wells. However, the EPA continues to monitor the effects of HF in coalbed methane well completion (EPA 2004). The EPA is currently undertaking a study to evaluate the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The latter EPA study is expected to be completed in 2014 (EPA 2013b).

No significant adverse impacts to surface water or groundwater resources are anticipated from workover operations, HF completions, or operation of the wells approved under the Proposed Action due to the following:

- The general BMPs listed in Section 5.0 are required conditions of approval.
- Groundwater protective measures are required and included to ensure protection of all freshwater bearing zones and the use of appropriate casing and cementing techniques, as well as the implementation of proper hazardous materials management.
- Protective casings on the well shafts must be used to protect shallow water-bearing rock formations during drilling and operation of the oil wells.
- Site-specific measures must be implemented as necessary to avoid contamination of stormwater with oil, grease, brine or other contaminants, and eliminate discharges into nearby surface waters.
- Site specific permit conditions will be required, as appropriate, in watersheds of sensitive public and private water supplies that have special requirements established by federally approved water quality standards.
- Site specific permit conditions will be required, if appropriate, to ensure that BIApermitted activities do not contribute to a violation of water quality standards,
  particularly where surface waters are officially listed on the CWA 303d list as impaired
  or threatened by chlorides, TDS, or oil and grease. Possible groundwater-surface water
  interactions will be considered during the review of permit applications and development
  of permit conditions
- Site specific permit conditions will be required, as necessary, to protect any wellhead protection zones (groundwater is being used for drinking water).

In situations where additional site-specific BMPs are required an additional project-specific EA may be required.

#### 4.4 Soils

A complete and detailed soil survey of Osage County has been completed by the U.S. Department of Agriculture, Natural Resources Conservation Service in 2012. Four major soil groupings exist in Osage County, which incorporate 70 individual soils as determined from this survey. The twelve soil associations can be categorized into three major groups. One group, the Verdigris-Mason-Wynona and Kiomatia-Mason-Roebuck Associations are comprised of soils which are deep, loamy sands found primarily on wooded floodplains. These two associations cover 14 percent of Osage County, and are used mainly for field crops and tame pastures. Uncleared areas of these soils support bottomland hardwoods with an understory of native tall grasses.

The second group is comprised of seven soil associations which cover about 50 percent of the county supporting the prairie-covered uplands. These seven associations are the Dennis-Parsons-Bates, Steedman-Coweta-Bates, Apperson-Wolco-Dwight, Shidler-Summit-Foraker, Grainola-Shidler-Stoneburg, Corbin-Pawhuska, and Norge-Vanoss. The soils in these associations are

used mainly for native range, native hay meadows and tame pasture. Native vegetation consists mostly of tall grasses. Soils that are free of stones and on level to gently sloping topography are suitable for cultivation. In some areas containing these soils, limestone is quarried.

The remaining group of three associations is comprised of the following: Niotaze-Darnell, Dougherty-Eufaula, and Darnell-Stephenville Associations. This group covers about 34 percent of the county. The soils are shallow to deep, loamy or sandy, and are found on wooded uplands. Some of the deeper soils are cultivated to small grains, cotton, or grain sorghum. Native vegetation is mostly postoak, blackjack oak, and hickory, with an understory of native tall grasses.

Generally, the soils in Osage County are a constraint to both mechanized agricultural production and urban and industrial development. Soil erosion is a major problem for cropland or other exposed surfaces on slopes greater than 2 percent. Most soils present moderate to severe limitations to recreational use, shallow excavations, basement construction, road bases, septic tank fields, sewage lagoons and sanitary landfills; and consequently, over 70 percent of the county remains in native grassland or partially wooded rangeland.

In the southeastern part of the county most of the soils are loamy and are moderately deep or shallow over sandstone. In the northeastern and western part of the county the soils are loamy and are dominantly moderately deep, with some shallow and deep soils over shale, and shale interbedded with sandstone. In the north-central, central, and south-central part of the county the soils are loamy and are moderately deep, with some shallow and deep soils over sandstone and sandstone interbedded with shale (USDA NRCS 2012a).

### 4.4.1 Potential Impacts to Soils

The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Topsoil stripped from areas of new construction will be retained for use during reclamation. Any areas stripped of vegetation during construction would be recontoured to original topographic variations and seeded with a native grass mixture within 6 months of construction cessation, environmental conditions permitting. No significant adverse impacts to soil resources are anticipated. Specific erosion control measures would be implemented when necessary at the proposed well pads. If needed, berms would be installed along the outer edges of the well pads, and well pad corners would be rounded.

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations and will reduce potential impacts to soil resources below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required.

#### 4.5 Wetlands

The USACE regulates the discharge of dredged and fill material into waters of the U.S., including wetlands, pursuant to Section 404 of the Clean Water Act. Additionally, Executive Order 11990 (protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

The National Wetland Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS) shall be used to identify seasonal freshwater emergent wetlands near workover operations. As the previously specified isolated ditch wetlands do not convey water to any navigable waters of the U.S., they would not be claimed jurisdictional by the U.S. Army Corps of Engineers; therefore, no jurisdictional wetlands would be impacted during construction of the proposed project.

## 4.5.1 Potential Impacts to Wetlands

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations and will reduce potential impacts to wetlands below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required.

#### 4.6 Prime Farmland

The Farmland Protection Policy Act (FPPA) states that federal agencies must "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses..." The NRCS is responsible for protecting significant agricultural lands from irreversible conversions that result in the loss of an essential food or environmental resource. Prime farmland is characterized as land with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops. This land either is used for food or fiber crops or is available for those crops, and not urban, built-up land, or a water area. The soil qualities, growing season, and moisture supply are those needed for a well-managed soil to economically produce a sustained, high yield of crops (USDA NRCS 2012).

# 4.6.1 Potential Impacts to Prime Farmland

Impacts as a result of the Proposed Action would be considered minimal, as operators will limit the area of impact and disturbance during workover operations. Losses of prime farmland will be temporary in nature, as the land will be reclaimed and placed back to natural conditions when the well production has ceased and final reclamation and plugging occurs. No significant impacts to NRCS-designated Prime Farmland soils are anticipated as a result of the proposed action.

# 4.7 Vegetation and noxious weeds

# 4.7.1 Vegetation

According to the Oklahoma Biological Survey, Osage County includes three major vegetation types: post oak-blackjack forest, tallgrass prairie, and bottomland forest along the Arkansas River. Vegetation types are influenced by precipitation, geology and soils, and fire and grazing disturbances. Post oak-blackjack forest, also known as cross timbers, is characterized by a mix of forest, woodland, and grassland vegetation. Post oak, blackjack, blackhaw, black oak, black hickory, buckbrush, gum bumelia, Mexican plum, redbud, roughleaf dogwood, and smooth and winged sumac are common woody species. The herbaceous layer contains beebalm; big bluestem, poverty grass, among others. The tallgrass prairies contain primarily grasses such as little bluestem, big bluestem, Indiangrass and switchgrass. Other herbaceous plants found in the tallgrass prairie are lead plant, Indian plantain, prairie clover, and many others. Tallgrass prairie

is commonly replaced by forests and woodlands in the absence of fire or grazing pressure and has declined in acreage during recent years. There is tremendous variation in species composition of bottomland forests, but most are dominated by hackberry, red elm, sugarberry, and green ash. (Hoagland 2008)

### 4.7.2 Noxious Weeds

"Noxious weeds" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These species may have high reproduction rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations.

## 4.7.3 Potential Impacts on Vegetation and Noxious Weeds

The Proposed Action may result in slight loss of vegetation that has revegetated the historical well pad site of the currently operating well pad. All workover operations must stay within the limits of the original well pad so vegetative impacts would be kept to a minimum. In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of noxious weeds. This EA requires the operator to control noxious weeds throughout the project area. If a noxious weed community is found, it must be eradicated unless the community is too large, in which case it must be controlled or contained to prevent further growth. The services of a qualified weed control contractor would be utilized.

Surface disturbance and vehicular traffic may not take place outside approved ROWs for the well pads, access roads, and utilities. Areas that are stripped of topsoil would be seeded and reclaimed at the earliest opportunity. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

With implementation of BMPs as describe in Section 5.0, any acreage disruption will result in negligible levels of vegetation disturbance and will not result in significant adverse impacts to vegetation resources.

#### 4.8 Wildlife

## 4.8.1 General Wildlife Species Occurrence and Habitat

In Osage County, migratory waterfowl such as ducks, herons, shore birds, and geese are known to frequent areas around rivers, streams, ponds, wetlands and lakes. Additionally, wildlife attracted to these areas includes muskrat, mink and beaver. Upland birds such as wild turkey, bobwhite quail, meadowlark, field sparrow, and doves are plentiful and can be found in agricultural and prairie lands. Birds such as bald eagle, golden eagle, marsh hawk, red-tailed hawk, red-bellied woodpecker, chickadee, tufted titmice, and numerous warblers and sparrows also are common. The area of Osage County that includes the Tallgrass Prairie Preserve is said to have over three hundred species of birds. Other species could include white-tailed deer, wild turkey, bobcats, coyotes, fox, jackrabbit, raccoon, squirrels, skunks, opossums, and armadillos, which are predominate throughout the County. Many ponds and lakes have been stocked with

game fish, principally bass, crappie, perch and catfish. Catfish and bass can also be found in the larger streams.

## 4.8.2 Potential Impacts to Wildlife

Proposed workover operations may result in short-term change to plant and animal species composition and altered utilization of the site and surrounding area by wildlife until reclamation occurs. Wildlife will be temporarily displaced, but the effects are short-term.

Depending on the level of revegetation of the well pad through interim reclamation since the original drilling activity, proposed workover operations may remove enough vegetation to reduce the total food, cover, and space for wildlife in the area. It is expected that wildlife species will temporarily relocate from the area during the implementation of the workover operation to avoid direct mortality due to the increase in human presence, and levels of noise.

Use of the general wildlife resource mitigation measures and standard BMPs will provide adequate protection to general wildlife populations and their habitats in the project area. For additional information on general BMPs and other operator-committed measures, please see Appendix D, Mitigation and Monitoring or Section 5.0 of this EA.

### 4.8.3 Threatened and Endangered Species

Section 7 of the Endangered Species Act (16USC 1531 et seq.) requires that federal agencies, in consultation with the USFWS, ensure that their actions are not likely to jeopardize the continued existence of any listed species, or result in adverse effects on designated critical habitat of such species. The Endangered Species Act also prohibits any action that results in a "taking" of any listed federally protected plant, fish or wildlife species. The Applicant and the BIA must ensure that the proposed action does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the adverse modification of a federally designated critical habitat of a listed species.

A list of federally-listed species that may be affected by the proposed action was obtained from the USFWS' Information, Planning, and Conservation System (IPaC) online database. Table 4-3 lists the species reported as well as their federal status and preferred habitat descriptions.

Species	Status	Preferred Habitat
Least Tern (Sterna antillarum)	Endangered	Formerly the major river systems of the Midwestern United States. These rivers included the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. Currently, they occur as small remnant colonies throughout their former range. In Oklahoma, least terns nest along most of the larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma. Least terns winter in South America.

Table 4-3. Federally-Listed Species, Status, and Preferred Habitat Descriptions

Piping Plover (Charadriusme lodus)	Threatened	Migration through Oklahoma is likely to occur from March-May and July-September. Piping plovers usually migrate as individuals or small groups and may be seen along sandbars of major rivers, salt flats, and mudflats of reservoirs. Piping plovers forage on these shoreline habitats and eat small invertebrates.
Red Knot (Calidris <i>canut</i> usrufus)	Proposed Threatened	The Red Knot is a migratory shore bird that breeds on the dry tundra in northern Canada, and winters along the coast of southern North America and South America. The Red Knot migration path brings it through Oklahoma.
Whooping Crane (Grus americana)	Endangered	The Whooping Crane inhabits a variety of wetland and other habitats, such as coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields.
Neosho Mucket (Lampsilisrafi nesqueana)	Endangered	The Neosho Mucket is a small mussel that is found in stable gravel and finer sediment in near shore and backwater portions of small rivers.
American Burying Beetle (Nicrophorusa mericanus)	Endangered	Considered to be a feeding habitat generalist, their reproductive habitat is believed to be more specialized. Habitat requirements are not fully understood, as the ABB has been found in various habitat types.
Rattlesnake- Master Borer Moth (Papaipemaery ngii)	Candidate	The Rattlesnake-Master Borer Moth is associated with prairie habitats and the rattlesnake master, a prairie plant that is its only food source. These moths depend on undisturbed prairie habitat to support their food source.

### 4.8.4 Migratory Birds

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 40 Stat. 755 as amended) protects migratory birds and most resident birds that are native to the United States. According to the MBTA, it is illegal to pursue; hunt; take; capture; kill; attempt to take capture, or kill; and active nests (and the eggs or young within). The MBTA does not prohibit harassment, disturbance, or habitat removal and alternations. Thus, MBTA prohibitions most relevant to the proposed action involve killing of a chick or egg through destruction of an active nest.

The USFWS estimates that many migratory birds are killed annually throughout the United States in oil field production skim pits, reserve pits, and centralized oilfield wastewater disposal facilities. Numerous grasshoppers, moths, June bugs, and the like become trapped on the surface in tanks and on pits, and become bait for many species of migratory birds. Open tanks and pits then become traps to many species of birds protected under the MBTA.

Unlike the MBTA, the Bald and Golden Eagle Protection Act (BGEPA) prohibits disturbance of eagles and the destruction of both active and inactive nests. Under BGEPA, permit programs are

available that may allow the Applicant to take an inactive nest or to disturb eagles at an active nest or eagle concentration area, if avoidance and minimization measures are implemented in coordination with the USFWS and the threshold of take for the regional eagle population has not been exceeded. In order to comply with the BGEPA, applicants must avoid clearing trees with eagle nests, unless the USFWS is contacted. In addition, during clearing and construction the Applicant must plan to avoid disturbing adult bald eagles, chicks and fledglings within the appropriate disturbance distance identified by the USFWS from the project site during the breeding season.

# 4.8.5 Potential Impacts to Threatened and Endangered Species and Migratory Birds

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations and will reduce potential impacts to migratory birds, eagles, threatened and endangered species below the level of significance threshold; therefore, preparation of an environmental impact statement is not required.

With the exception of the American burying beetle (ABB), the likelihood for preferred habitat to occur within the project area for proposed workover operations is minimal. If upon further review of the proposed workover operation by the BIA, it is determined that suitable habitat may exist for the ABB, the Lessee/Operator must take the appropriate steps to ensure that no negative impacts will occur to the ABB before workover operations commence.

## 4.9 Agriculture

Ranching is the main enterprise in Osage County. According to the 2007 Agricultural Census, livestock sales accounted for \$127 million, or 96 percent, of the total agricultural market. Osage County ranks 9<sup>th</sup> out of the 77 counties in Oklahoma in total value of agricultural products sold (USDA NASS 2007a). The average operating ranch unit is approximately 83.5 acres. About 75 percent of the land in farms or ranches is open range, 12 percent is wooded range, 7 percent is cropland, and 6 percent is tame pasture. Small grains, mainly wheat, alfalfa, grain sorghums, and soybeans are the principal crops. Corn and sorghums cut for silage and used by local dairies, and orchard crops are grown on a minor acreage. A large acreage of native grasses and tame pastures are cut for hay which is mostly used by local farms and ranchers. The other crops are shipped to local and distant markets and sold for cash. Approximately 75 percent of the annual production on rangeland grows in April, May, and June coinciding with spring rains and moderate temperatures. A secondary growth period generally occurs in September and October coinciding with fall rains and cooling temperatures (USDA NRCS 2012a).

# 4.9.1 Potential Impacts to Agriculture

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations and will reduce potential impacts to agricultural lands below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required.

#### 4.10 Cultural Resources

Based on previous archaeological work within Oklahoma, portions of the state have been inhabited by humans for at least 12,000 years. Throughout most of the state, the recorded prehistoric occupations range from Paleoindian Period encampments to Late Prehistoric Period sites. Some areas within the region hold a long history of Native American habitation. Multiple sites have been explored that suggest the area was inhabited by societies adapted for various geographical regions of the area dating back to 6000 B.C.

Historic Period sites vary widely across Oklahoma. Structures and buildings associated with preremoval and post-removal historic Native American tribes, non-Indian settlements of the Oklahoma Territory beginning in 1889, farming, and the late nineteenth/early twentieth century petroleum industry are commonly encountered.

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR 60.4) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for inclusion in the National Register if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed in the National Register, even when no formal nomination has been filed. This process of taking into account an undertaking's effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking (Executive Order 13175). The Osage Nation has designated a Tribal Historic Preservation Officer (THPO), whose office and functions are certified by the National Park Service. The BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within Osage County.

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and THPO. Unexpected or

inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Compliance with Section 106 of the NHPA will be determined on a project specific basis. Following any such discovery, operations shall not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the Proposed Action.

## 4.10.1 Potential Impacts to Cultural Resources

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations and will reduce potential impacts to cultural resources below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required.

If it is determined that the proposed workover activity may impact cultural resources, a cultural resource evaluation and the section 106 NHPA consultation process must be completed before workover operations commence.

## 4.11 Public Health and Safety

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The Osage County Sheriff's department as well as several local agencies provides law enforcement services. In addition, the Osage Nation Police Department (ONPD) is charged with enforcing all tribal, state, and federal laws on the Osage Nation Reservation. The ONPD is directed by a Chief of Police who is responsible for the day to day operations of the police department (Osage Nation 2012). Fire and emergency response is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, and Wynona. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust land on the Osage Nation Reservation.

Health and safety concerns include H<sub>2</sub>S gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H<sub>2</sub>S is extremely toxic in concentrations above 500 parts per million and is known to occur in varying concentrations within the Osage Nation Minerals Reserve. Standard mitigation measures would be applied, and because release of H<sub>2</sub>S at dangerous concentration levels is very unlikely, no direct impacts from H<sub>2</sub>S are anticipated with implementation of the Proposed Action.

All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and county roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

### 4.11.1 Hazardous Materials

The Pipeline and Hazardous Materials Safety Administration (PHMSA), a federal agency within the USDOT, is the primary federal regulatory agency responsible for ensuring the safety of American's energy pipelines, including crude oil pipeline systems. As a part of the responsibility, PHMSA established regulatory requirements for the construction, operation, maintenance, monitoring, inspection and repair of hazardous liquid pipeline systems.

Hazardous substances are defined as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health and the environment. Hazardous substances are primary generated by industry, hospitals, research facilities, and the government. Improper management and disposal of hazardous substances can lead to pollution of groundwater or other drinking water supplies and the contamination of surface water and soil. The primary federal regulations for the management and disposal of hazardous substances are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

Safety and security issues considered in this EA include the health and safety of the area residents and the public-at-large, and the protection of personnel involved in activities related to the proposed management activities. Executive Order 13045 (Protection of Children) requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children.

# 4.11.2 Emergency Response

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The county has a Sheriff's department and in addition several towns within the county have local law enforcement. On November 8, 1994 pursuant to the National Council Bill Number 10; the Osage Nation elected to establish a law enforcement agency to be called the Osage Nation Police Department (ONPD). The ONPD is charged with enforcing all laws including Tribal, state, and federal in Osage County.

Fire and emergency response within the county is the primarily the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, Wynona, Pawhuska, among others, and including rural volunteer fire department. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust lands in Osage County.

# 4.11.3 Potential Impacts to Public Health and Safety

With the implementation of the described reporting and management of hazardous materials, no adverse impacts to public health and safety are anticipated as a result of the proposed action. Other potential adverse impacts to any nearby residents from construction activities related to the workover operations would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about 30 days during construction, drilling, and well completion as equipment and vehicles move on and off the site, and then diminish sharply after the workover operations are completed. Workover activities may increase the productivity of certain wells and it is assumed that one small pumper truck would visit the well once a day to check the pump. Wells typically produce both oil and water. Gas may be temporarily flared, and only after applicant receives written authorization from the Osage Agency Superintendent according to 25 CFR 226.37. Oil and produced water would be connected to existing gathering systems and then processed and stored in tanks at a centralized tank battery. Produced water would be disposed of in an EPA approved disposal well, and oil would be hauled out by tankers.

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations described in the "Proposed Action Alternative" section and will reduce potential impacts to public health and safety below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required.

#### 4.12 Socioeconomics

This section discusses socioeconomic characteristics such as population, housing, demographics, employment, and economic trends within the analysis area. Also included are data relating to the State of Oklahoma and the United States, which provide a comparative discussion when compared to the analysis area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the State of Oklahoma.

# 4.12.1 Population and Demographic Trends

According to the U.S. Census Bureau, the 2010 population estimate for Oklahoma was approximately 3.75 million, as shown in Table 4-4. Between the years 2000 and 2010, the state population grew by 8.7 percent. The population of Osage County grew at a similar rate to the state.

Table 4-4. Population Change in Osage County, Oklahoma.

Region	Popu	Percent Change	
	2000	2010	2000-2010
Oklahoma	3,450,654	3,751.351	8.71
Osage County	44,437	47,472	6.83

Source: USCB, 2000 and 2010 Population Estimates

Table 4-5 presents the racial composition of Oklahoma and Osage County. The dominant race in Oklahoma and Osage County is white, comprising 65 percent of the population in Osage County. The next most represented race in Osage County is American Indian/Alaska Native, comprising 14 percent of the population in Osage County.

Table 4-5. 2010 Census Population by Race in Osage County, Oklahoma.

Category	Osage C	Osage County Oklahoma		oma
	Population	%	Population	%
Hispanic/Latino	1,366	2.88	332,007	8.85
White	30,709	64.69	2,575,381	68.65
Black or African American	5,355	11.28	272,071	7.25
American Indian/Alaska Native	6,704	14.12	308,733	8.23
Asian	118	0.25	64,154	1.71
Native Hawaiian and Other Pacific Islander	11	0.02	3,977	0.11
Some Other Race	14	0.03	2,954	0.08
Two or More Races	3,195	6.73	192,074	5.12
Total Population	47,472		3,751,351	

Source: USCB, 2010 Census

Table 4-6 presents the population in the workforce in Osage County. Approximately 78% of the Oklahoma population is 16 years old, or older, and part of the workforce. Osage County follows the same trend with 78 percent in the workforce.

Table 4-6. 2010 Census Population in the Workforce in Osage County, Oklahoma.

Region	Population Percent	
Oklahoma	2,924,289	77.95
Osage County	37,292	78.56

Source: USCB, 2010 Census

Total "non-farm employment" in Oklahoma increased by approximately 22,800 jobs in 2011. The largest non-farm related employer industry in Oklahoma is the government, which includes jobs in public schools, law enforcement, and tribal government, followed in number of non-farm jobs by trade, transportation, and utilities jobs. In 2011 the mining and logging industry experienced a growth of 15 percent, the greatest of all industries within Oklahoma. Other industries that grew in 2011 includes manufacturing; trade, transportation and utilities; education/health services, leisure/hospitality; and government. Industries that saw a decline in employment in 2011 include construction, information, financial activities, profession/business services, and other services (OESC 2012).

The 2010 median household income for Oklahoma was \$42,979. Median household income was slightly lower than the state average in Osage County (USCB 2010).

## 4.12.2 Potential Impacts to Socioeconomics

Impacts to socioeconomic resources of the analysis area would be incremental and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the implementation of proposed workover operations. Long-term effects would occur during the production phase, should the workover operations prove successful in prolonging or increases the production of the wells.

Implementation of the Proposed Action would likely result in direct and indirect economic benefits associated with industrial and commercial activities in the analysis area. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in the surrounding area, which would be subject to sales and lodging taxes. Other state and local tax payments and fees would be incurred with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those who were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

#### 4.13 Environmental Justice

Executive Order 12898 directs federal agencies to consider environmental justice in connection with their programs and activities. It requires federal agencies to "...analyze the environmental effect, including human health, economic and social effects of federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act of 1969 (NEPA)..." Furthermore, it states that "...each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies or activities on minority populations and low-income populations..." Memorandum accompanying E.O. 12898, February 4, 1994

The affected area analyzed in this Environmental Assessment is Osage County, which is the homeland of the Osage Tribe of Indians. There is a higher percentage of Native Americans in

Osage County as compared to the State of Oklahoma, as shown in the table contained in Appendix C.

Osage County has a slightly lower percentage (14.5 percent) than the state of Oklahoma (16.9 percent) with regard to the population below the poverty level. At the same time, Osage County has slightly lower per capita income (\$22,353) than the state (\$24,208), and a slightly lower median household income (\$44,195) compared to the state (\$45,339). See Census Quickfacts (Appendix C) at www.quickfacts.census.gov/.

The percent of the Oklahoma population 5 years and over with a disability is 21.6 percent. Osage County has a slightly higher disability rate than the state. Overall, within the three age groups, the population 65 years and over has the highest rate of disability (USCB 2000b).

In order to advance environmental justice, BIA and other federal agencies should pursue fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. EPA has developed the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)* and various tools such as EJ View to assist with statistics and methodology for identifying communities of concern.

### 4.13.1 Potential Impacts to Environmental Justice

At least one factor commonly used to review the potential for environmental justice concerns is present within Osage County. The population of Osage County includes a higher percentage of persons identifying as a minority (Native American and Black) than the State of Oklahoma. The majority of persons identifying as Native American are likely Osage citizens.

There is no reason to suspect that the Proposed Action would have direct disproportionate impacts on any minority since potentially affected landowners will be located at dispersed locations across the county. However, since the entire analysis area of Osage County is located within the homeland of the Osage people, there is the potential for adverse impacts to traditional lifeways and cultural resources from the potential disturbance of any traditional gathering places, cultural properties and cultural resources.

The BIA is unaware of any places in Osage County that are used for traditional gathering and hunting purposes. However, BIA frequently coordinates with the Osage Minerals Council and the Executive Branch of Osage Nation, and maintains a Complaint Hotline for persons who have concerns about oil and gas development.

BMPs and mitigation measures required by the BIA provide protection against adverse impacts. Current BMPs require that work be immediately stopped following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work

stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The Proposed Action is likely to directly benefit Osage citizens who are headright holders. Osage headright holders derive direct economic benefit from increased production of oil and gas, since they receive annuity payments based on royalties received from that production. Osage citizens and other minorities will also likely benefit from employment opportunities associated with a healthy oil and gas industry, as will residents of Osage County as a whole.

Implementation of the best management practices described in Section 5.0 are included as conditions of approval for the proposed workover operations described in the "Proposed Action Alternative" section and will reduce potential impacts to environmental justice below the level of significance threshold; therefore, the preparation of an environmental impact statement is not required. The proposed alternative would be economically beneficial to the shareholders of the Osage Minerals Estate due to potential increased production. The BIA Osage Agency's procedures for compliance with NHPA and other laws, regular consultation and coordination with the Osage Tribe and the list of BMPs contained in the EA, will ensure there are no significant disproportionate impact to natural resources, cultural resources or traditional life ways of the Osage Tribe.

### 4.14 Lifestyles and Cultural Values

Oklahomans are proud of their diverse cultures, scenic landscapes, and hospitality. Oklahoma has a history of rich American Indian culture and currently, Oklahoma is home to more than 67 tribes. Additionally, Oklahoma has a long standing tradition of rodeos and is home to horse and cattle ranches with working cowboys. Over 100 traditional and Indian rodeos occur through the year in Oklahoma (Shop Oklahoma 2012).

The Osage Nation is headquartered in Pawhuska, Oklahoma and has approximately 14,500 members nationwide. The Cultural Center, located in Pawhuska, was established in 2004 to maintain the ancestral traditions, values, and way of life of the Osage Nation. To maintain the values of their ancestors and their unique identity, the Osage Nation preserves the lessons of their ancestors. The Cultural Center hosts classes on traditional Osage language; traditional craftwear, hosts artwork exhibits, and is home to a library (Osage Nation 2012 and Shop Oklahoma 2012).

# 4.14.1 Potential Impacts to Lifestyles and Cultural Values

Implementation of the proposed action alternative will not result in significant adverse impacts to this component of the affected environment and would not normally require implementation of additional mitigation measures or BMPs. However, approval of individual workover operations may require site specific conditions or additional measures to protect trust or restricted Indian lands and other important tribal resources. In situations where additional site-specific BMPs are required an additional project-specific EA may be required.

#### 4.15 Infrastructure

Osage County is generally rural with small farming communities and rural residences are scattered throughout; there is limited infrastructure development. There is very little urban development in the County with the exception of the southeast corner which borders the city limits of Tulsa. Communities within the planning area are served by multiple municipal services including police, fire, water, power and other utilities.

### 4.15.1 Potential Impacts to Infrastructure

Implementation of the proposed action alternative will not result in significant adverse impacts to this component of the affected environment and would not normally require implementation of additional mitigation measures or BMPs. In situations where additional site-specific BMPs are required an additional project-specific EA may be required.

#### 4.16 Resource Use Patterns

### 4.16.1 Hunting, Fishing and Gathering

The Oklahoma Department of Wildlife Conservation (ODWC) provides habitat conservation and management efforts across the state at designated Wildlife Management Areas (WMAs). Game species in the state include: antelope, bear, dove, deer, elk, furbearers, feral hogs, mountain lion, quail, peregrine, pheasant, turkey, waterfowl, and various other small game and migratory birds. Hunting seasons vary for the various species, but in general hunting occurs in the fall and winter, October through December.

Additionally, the ODWC manages and stocks lakes and ponds through the state. Fish species produced and stocked annually include largemouth bass, smallmouth bass hybrid, walleye, brown trout and rainbow trout.

Within Osage County there are 6 designated WMAs that provide opportunities for hunting, fishing and camping. Some of the WMAs include U.S. Army Corps of Engineers (USACE) operated and controlled reservoirs while the park and/or WMA is operated by the ODWC. The USACE creates reservoirs for flood control, water supply, irrigation, hydropower, navigation, recreation, and fish and wildlife (ODWC 2012c). The WMAs in Osage County include: Hula, Osage, John Dahl, Candy Creek, Keystone, and Skiatook.

## 4.16.2 Timber Harvesting

Osage County is located within the Cross Timbers ecological region (USEPA 2012a). The hardwood community consists primarily of short oak trees that are not prime timber for harvest. However, forested areas have been cleared to create open sections for rangeland, pastures, and farmland.

#### 4.16.3 Recreation

Osage Hills State Park offers 1,100 acres with picnic tables and shelters, RV campsites, cabins, a swimming pool, hiking trails, a ball field, and a tennis court. Fishing for bass, crappie, catfish and perch is common in Lookout Lake or in Sand Creek at the south end of the park. The park is also used for fall foliage viewing (OHSP 2012).

Walnut Creek State Park is located on Lake Keystone and offers fishing, boating, camping, swimming, and water skiing. The 15-mile Sand Plum Trail that features flat to rolling terrain with many vistas of the lake is open to hikers, mountain bikers and horses (OTRD 2012).

Keystone State Park is located on Keystone Lake and offers boating, ATV trails, water skiing, and fishing (OTRD 2012).

## 4.16.4 Land Use Plans

The Osage County Assessor's Office provided information on the number of acres in each of the major land assessment categories. The data shows that almost 95 percent of Osage County is categorized as rural agricultural with rural residential comprising 2.6 percent of the county.

# 4.16.5 Noise and Light

The Noise Control Act (42 USC 4901-4918) initially was implemented through regulations issues by the USEPA in the early 1980s; however, the primary responsibility for regulating noise has been delegated to state and local governments.

Noise in generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds audible to the human ear. The Day-Night Average Sound Level (DNL) is an average measure of sound.

The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. USEPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools or hospitals.

Osage County is comprised of mostly rural land with occasional residences located throughout. Because of the rural character of the planning area, noise control ordinances are most likely not in place. Excessive artificial lighting is not a current concern for Osage County because of the rural character of the land. No lighting ordinances are in place for the county.

#### 4.16.6 Visual

The visual character of the planning area is a function of the terrain, land cover, and land use. Osage County is generally rural with small farming communities and rural residences are scattered throughout. The planning area is dominated by agricultural fields, woodlands, and pastures/grasslands. Highways, local roads, and railroads, multiple transmission lines, distribution lines, and other types of development occur, contributing to the overall visual character of the area. No designated scenic rivers or areas occur within the analysis area (National Wildlife and Scenic Rivers System 2012).

# 4.16.7 Potential Impacts to Resource Use Patterns

Based on the limited and short term nature of proposed workover operations, no significant adverse impacts to any resource use patterns are anticipated as a result of the proposed action alternative and would not normally require implementation of additional mitigation measures or BMPs. In situations where additional site-specific BMPs are required an additional project-specific EA may be required.

#### 5.0 MITIGATION AND MONITORING

The protective measures and procedures in this document are required as conditions of approval for workover operations described in the Proposed Action Alternative. Monitoring of cultural resource impacts by qualified personnel is recommended on a case by case basis for all ground-disturbing activities. When appropriate, each phase of implementation would be monitored by the BIA and representatives of the Osage Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BIA and the responsible Lessee/Operator that documents the results of monitoring to eliminate any adverse impact on the environment.

Mitigation can be found in general and operator-committed BMPs and mitigation measures. BMPs are defined as a proactive method of mitigating impacts to the affected environment by the proposed action. The Lessee/Operator will be required to implement BMPs as conditions of approval for workover operations described in the Proposed Action Alternative in an effort to mitigate environmental concerns.

# 5.1 Summary of Permit Conditions

The Osage Agency Form 139, Attachment A which identifies all of the conditions of approval of workover operations in Osage County (listed below), and the Workover Review form will be provided to the Lessee/Operator upon approval by the Agency and must be kept at the project site at all times during the workover operation(s).

# **General Requirements**

All lessees must comply with the requirements of 25 CFR 226, including but not limited to:

- § 226.22 Prohibition of Pollution.
- § 226.19 Use of Surface Lands Lessee must conduct operations in a workmanlike manner, commit no waste and not create any unavoidable nuisance on the premises under his/her control.

Workover operations must be contained to the historic well pad in order to minimize impacts to the affected environment. This must be documented through the submission to the Osage Agency of photographs taken before the proposed activities commence and after activities have ceased.

For each workover operation a minimum of seven (7) dated photographs must be submitted as supporting documentation with the Form 139 in order to depict the existing condition of the well pad and existing facilities as described below.

- 1 photo of the well sign
- 1 photo of the well head (well bore/pumping unit location
- 1 photo of the lease road, showing ingress and egress to the proposed workover location
- 4 photos taken in the following manner: stand at the center of the well pad and take 1 photo facing each direction (North, East, South and West)

All lessees must comply with, and obtain any necessary permits or authorizations required under the federal Clean Water Act, Clean Air Act, Safe Drinking Water Act, Endangered Species Act and other applicable federal laws.

In addition, the following standard BIA Osage Agency Best Management Practices (BMPs), known as "Attachment A", shall apply, unless the Superintendent has given prior written approval of either 1) an exemption to a specific standard BIA Osage Agency BMP, and 2) an equivalent set of BMPs developed by the Lessee and incorporated as conditions of approval for the workover operation.

#### Standard BMPs

The following BMPs shall be followed by lessees, their agents, operators, and contractors:

- Avoid impacts to National Register-eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, stop work immediately, secure the affected site, and notify the BIA and Tribal Historic Preservation Officer. In the event of a discovery, work in that area shall halt and not resume until written authorization to proceed has been received from the BIA. All surface disturbances must be kept within the confines of the historic well pad described in the permit application package. Expansion or relocation of the well pads, access roads, or other implementation of additional activities outside of the permitted area is prohibited unless an appropriate cultural resources survey has been submitted and determined adequate, approved by the BIA Osage Agency and all appropriate permits have been obtained.
- Avoid or minimize soil and vegetation disturbance. Avoid removal of or damage to trees, shrubs, and groundcover to the extent possible. Avoid or minimize alteration of the natural topography, and limit activities on steep slopes.
- Erosion control measures are required for the duration of all implementation phases of the proposed project. Erosion control measures must effectively minimize the movement of soil, debris or contaminants from the project site to adjacent lands and waterways.
- All vehicles and equipment must utilize and stay confined to existing roads described in the approved EA. These roads must be maintained and upgraded as needed according to BIA direction and agreements between the operator and surface owners.
- Tank batteries must have a Spill Prevention and Control and Countermeasure Plan (SPCC) in compliance with EPA Regulations under 40 CFR Part 112. A fluid impermeable secondary containment dike/berm must be constructed around any tank battery and facilities according to 40 CFR 112.7. The dike/berm and entire containment area must be graveled. No water collected within the secondary containment shall be discharged. In accordance with the SPCC plan and the BIA regulations, the Lessee will immediately notify the BIA of all spill incidents.

- No venting or flaring of gas is allowed unless prior written approval of the BIA Osage Agency Superintendent has been obtained.
- Store and label chemicals properly (including secondary containment). Do not store equipment or chemicals onsite if they are not being used on site. Do not leave open containers of chemicals or wastes on site.
- Keep sites clean and free of any litter, trash, old equipment, contaminated soil or unused containers. Promptly dispose of any wastes at appropriate recycling facility, approved landfill or other approved location. Remove any unused equipment not necessary to the operation of the lease after drilling activities have been completed.
- All production equipment, facilities and tanks including well-head and above-ground piping/equipment shall be properly enclosed to exclude livestock if present.
- All pits (including tank batteries contained within a dike/berm) must be enclosed with a fence of at least four strands of barbed wire, or approved substitute. All earthen pits to be used for storage of salt water or other deleterious substances must be lined with an impermeable layer to prevent contamination of soils and groundwater. Temporary pits must be filled and leveled immediately upon completion of the activity.
- To the extent possible, minimize disturbance to land owners, wildlife, and natural resources due to noise, excessive traffic, dust or other impacts associated with operations.
- Do not conduct activities within stream channels or wetlands without proper authorization, and avoid any discharge of soil or contaminants or removal of stream water that could result in a violation of applicable federally-approved water quality standards.
- Restore disturbed areas by re-establishing vegetation using seed, sod or other approved
  method, and add clean soil to disturbed areas if necessary. Restore with native species
  unless otherwise directed by the surface owner in writing and approved by the BIA. No
  noxious or invasive species may be used in revegetation and reclamation activities.
- Upon conclusion of workover operations all areas of the surface disturbance (i.e. well pad, access road, pipeline, etc.) shall be promptly reclaimed as described in the permit and approved Programmatic EA for workover operations. After a well is no longer in production, reclamation of the site will begin promptly. Reclamation shall be completed not later than ninety (90) days from rig removal, well abandonment, conclusion of workover operations or final plugging of a well, unless otherwise approved by the BIA.
- The lessee shall conduct activities in a manner that avoids any potential incidental take or harm to federally-listed threatened and endangered species, or in a manner that complies with any permit or authorization issued by the U.S. Fish and Wildlife Service (USFWS).

Lessee must follow guidance in the USFWS "Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil

and Gas Projects (April 2014), found at the following website: <a href="http://www.fws.gov/southwest/es/oklahoma/documents/abb/abb\_icp/migbird%20">http://www.fws.gov/southwest/es/oklahoma/documents/abb/abb\_icp/migbird%20</a> and%20eagle%20avoidance%20measures%20april2014.pdf

- Lessee must follow USFWS established protocol regarding areas where the American burying beetle (ABB) is known or suspected to exist. See <a href="http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm">http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm</a>. If proposed operations require the construction of a drilling pit or other excavation activity by heavy equipment, then the lessee must ensure that suitable habitat for the ABB does not exist. If proposed operations will impact suitable habitat for the ABB, it will be the responsibility of the lessee to obtain authorization from the USFWS to proceed with that portion of the project.
- Approval must be obtained from the Environmental Protection Agency prior to the commencement of workover operations related to underground injection, construction or conversion of saltwater injection/disposal wells.

#### 6.0 CUMULATIVE IMPACTS

#### 6.1 Environmental

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances within Osage County include farming, grazing, roads, and other oil and gas wells. Farming and grazing activities occur in Osage County regardless of the density of oil and gas development, since undivided interests in the land surface, range permits, and agricultural leases are often held by different surface owners than those holding mineral rights, such that economic benefits of both agricultural and oil and gas activities currently co-exist.

Reasonably foreseeable impacts of future developments in Osage County must also be considered. Should development of proposed well pads prove productive, it is likely that lessees would pursue additional development in the County. The life of existing wells within Osage County will be prolonged through the approval of workover operations by the BIA, which would in turn increase the potential for new wells to be drilled within existing leases. For purposes of cumulative impact analyses, the density of active and permitted oil wells and associated facilities (including access and utility corridors) is expected to increase steadily within the County over the next decade. Oil and gas development is expected to have a minor cumulative effect on land use patterns and the human and natural environment, due to the dispersed and passive nature of the development.

#### 6.2 Air Quality

If the pace and level of oil and gas development within this region of the state continues at the current rate over the next few years, it is expected to contribute incrementally to cumulative air quality impacts. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during completion of the workover operation and would

therefore be localized, largely temporary, and limited in comparison with regional emissions. Since the AQI is exceptionally low in Osage County and the expected future development would be widely dispersed in time and space, the Proposed Action is not expected to impact attainment status based on any of the Primary and Secondary NAAQS for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

# 6.3 Hydrology

No surface discharge of water would occur under the Proposed Action, nor would any unpermitted use of surface water or groundwater occur as a result of project development. The Proposed Action, when combined with other future actions, such as cattle grazing, other oil and gas development, and agriculture in Osage County would tend to increase sedimentation and runoff rates.

Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in nearby watersheds. However, any potential increase in degradation would be reduced by the commitment of the Applicant to minimizing disturbance, using erosion control measures, and implementing BMPs designed to reduce impacts.

#### 6.4 Access Roads

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The proposed workover permit would most likely not require new road construction, but if required, additional roads would add incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BIA Osage Agency for approval. Additional wells are likely to be drilled in the same general area as the Proposed Action, using many of the same main access roads and minimizing the disturbance as much as possible.

#### 6.5 Erosion Control

The Lessee/Operator is committed to using BMPs to mitigate the potential effects of erosion. BMPs would include implementing erosion and sedimentation control measures as necessary to avoid increased sedimentation in nearby water bodies.

#### 6.6 Vegetation

Proposed workover operations are not anticipated to create a loss of vegetation as new ground disturbance would be kept to a minimum, however, if a loss of vegetation does occur it could create decreased ecological diversity of mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in Osage County. Continued oil and gas development could result in the loss, and further fragmentation, of mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present,

and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures and BMPs. Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

#### 6.7 Wildlife

Cumulatively, the potential impacts on various species and their habitats would be minimal. Currently, no adverse impacts have been identified for either Osage County, or the adjacent areas. BMPs are designed to protect individual species and classes of species of interest would also protect most of the remaining species both locally and cumulatively.

#### 6.8 Cultural Resources

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the Proposed Action.

#### 6.9 Socioeconomic

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action would result in an additional source of revenue for shareholders of the Osage Minerals Estate. Increases in employment would be temporary during the construction, drilling, and completion phases of the Proposed Action. Therefore, little change in employment would be expected over the long term.

No significant negative impacts are expected to affect any element of the human and natural environments; impacts would generally be low and mostly temporary from both a context and intensity standpoint. Current impacts from oil and gas-related activities are still fairly dispersed, and required BMPs will limit potential impacts. The cumulative impacts from activities in the county are still limited enough to not appear to be significant.

#### 6.10 Reclamation

The Lessee/Operator is committed to implementing interim reclamation of any necessary ground disturbance areas immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.

#### 7.0 CONSULTATION AND COORDINATION

The BIA is committed to ongoing efforts to solicit the opinions and concerns of all stakeholders. For the purpose of this EA, a stakeholder is considered any Tribe, agency, municipality, or

individual person which the Proposed Action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. The BIA has informally engaged the Osage Minerals Council in discussions about the NEPA process as it relates to this EA. The BIA has received comments concerning NEPA and environmental concerns from lessees, operators, Osage headright holders, nonprofit environmental organizations, the Osage Producers Association, the Osage Cattlemen's Association, state agencies, landowners and other interested stakeholders at various meetings of the Osage Minerals Council, at joint EPA/BIA stakeholder meetings on updates to the Osage Producers Manual, and in connection with the issuance of a Programmatic Environmental Assessment for Leasing Discussion of issues with the Osage Nation, Osage Minerals Council, and Oklahoma Department of Wildlife Conservation, U.S. Fish and Wildlife Service and others is ongoing, including meetings of cooperating agencies on the county-wide Environmental Impact Statement for Oil and Gas Operations in Osage County. A copy of this PEA for Workover Operations will be available to the public, and it will be submitted to the Osage Nation and Osage Minerals Council.

#### 8.0 LIST OF PREPARERS

An interdisciplinary team contributed to this document according to guidance provided in Part 1502.6 of Council on Environmental Quality regulations. This document was drafted by the BIA Osage Agency.

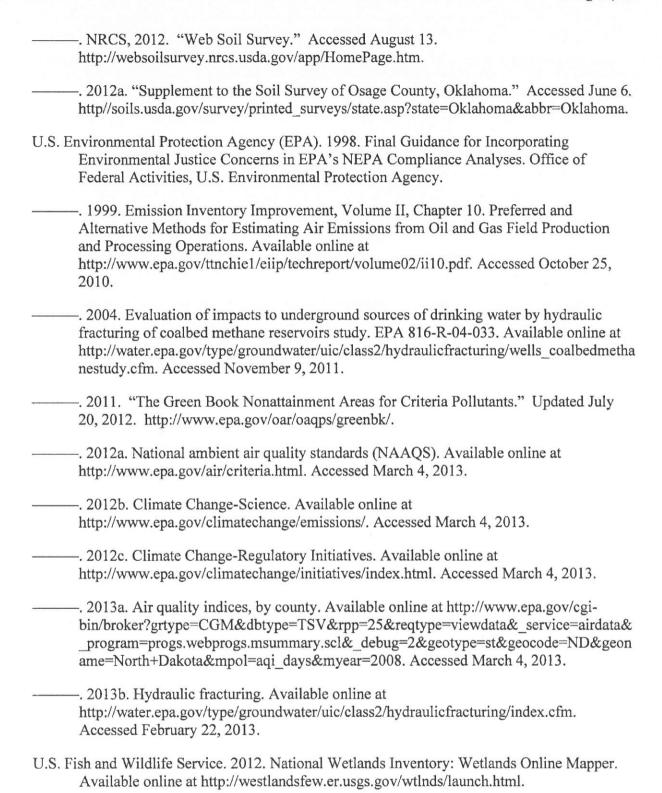
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# Appendix A

**BIA Program Operational Responsibility and Procedures** 

# Appendix A

# Program Operational Responsibility and Procedures

# Leasing Procedures - Oil and Gas

A lease can be obtained for oil, gas or for a combination of oil and gas mining. A prospective lessee (any individual person, a firm or a corporation) must nominate a specific tract of land for the type of lease desired. The nominations take place about two months prior to each lease sale. The nominated tracts (generally quarter sections or 160 acres) are put up for auction at publicly advertised sales which take place three times annually. A nominating bid must accompany each tract nomination before the tract is considered for listing at the sale. Each nominating bid is reviewed by the Osage Agency Minerals Branch staff and, if the nominating bid is considered to be an equitable amount, the tract is advertised for sale. An oral auction is conducted at each lease sale and the highest bidder is awarded an oil, gas, or combination oil and gas lease on the tract in question.

After successful bidders are determined for each tract, the bidder must obtain a performance bond and file other necessary papers before the lease is approved. Successful bidders must deposit with the Superintendent on the day of the sale a check or cash in an amount not less than 25 percent of the cash bonus offered as a guaranty of good faith. Bonuses are money offered by prospective bidders to enhance acceptability of their bids. Within 20 days after notification of being a successful bidder, the bidder must submit to the Superintendent the balance of the cash bonus, a \$10 filing fee, and the lease in completed form. The Superintendent may grant time extensions for completion and submission of lease forms, but no extension can be granted for remitting the balance of moneys due. If the lease in not completed or the lease is rejected through no fault of the Osage Minerals Council or Superintendent, the 25 percent of the cash bonus bid is forfeited to the Osage Tribe. The Superintendent may reject a lease made on an accepted bid upon evidence satisfactory to him/her of collusion, fraud, or other irregularity in connection with the notice of sale.

The Osage Minerals Council now establishes the term of each lease which is published with each sale notice. A primary term of X years is currently used as the normal period. Regardless of the length of the primary term, a lessee must complete a well producing and selling oil and/or gas in paying quantities within 12 months of the date of approval or pay rental, or the lease will terminate.

On many occasions, tracts, which have been leased in the past, but on which few or no producing oil or gas wells (in paying quantities) were brought in, have been leased a second time. Virtually the entire County has been repetitively leased, parts of it more than four or five times. Several large tracts of land are under blanket leases known as concession agreements. These leases are held by larger companies for indefinite periods until production ceases.

Both unitizing (merging) and transferring of leases is permitted under proper conditions. Lease assignments or transfers require the qualification of the new owner, a satisfactory performance bond and approval by the Superintendent.

# Geophysical Exploration

Although fields of major drilling activity and production are fairly well known in Osage County, some areas are relatively less explored. Likewise, some geological strata and formations have received more attention than others. The Superintendent oversees and approves oil and gas geophysical and geological exploration.

Geophysical exploration permits are issued infrequently, but in most cases existing county and lessees' access roads are used, but in some instances equipment is transported over pastures or wooded lands without constructing roads, weather conditions permitting. If required, shot holes are drilled for seismic surveys. A commencement fee of \$25 per acre must be paid to the surface owner. After surveys are completed, shot holes are filled and each area is leveled and returned to as near original condition as feasible as soon as all work is done. Damages are paid to the surface landowner for all geophysical work conducted on his property.

# Leasing Procedures - Other (Sand, Gravel Rock)

Permits are processed through the Branch of Minerals at the Osage Agency and are subject to 25 CFR Part 214. The review and/or approval of the permit application may take up to 60-90 days to complete as the Osage Agency, working in coordination with the Applicant, must demonstrate full compliance with the National Environmental Policy Act, the National Historic Preservation Act and the Endangered Species Act. The circumstances of each permit may vary and this time period may be greatly reduced depending on the situation. Renewal of an existing mining permit may be completed in 15-30 days.

A list of procedures for obtaining sandy soil and rock mining permits is available at the Osage Agency upon request, but generally include the following steps: (1) letter to the Superintendent, (2) completion of the original permit forms, (3) acquisition of a surety bond or escrow, (4) payment of an annual minimum advance royalty payment, (5) once approved the permit requires the Lessee to complete monthly production reports during the entire term of the permit, even during periods of no production. The monthly reports and royalty owed are due by the 25<sup>th</sup> of the month following the month of production.

# **Drilling Activity**

A lessee must submit to the Osage Agency a permit application to drill each well. Upon approval, the Superintendent issues the lessee a drilling permit. Prior to filing an application to drill, the lessee must contact the surface owner and discuss the route of ingress and egress to the proposed well site. The only activities which may take place prior to the meeting of the lessee and surface owner are surveying and staking of well sites. At the meeting, in addition to discussing the route of ingress and egress, the lessee must give the surface owner the name and address of the representative upon whom the surface owner must serve any claim for damage which he may sustain from mineral operations. If the drilling is to be on restricted Indian land, the meeting takes place with the Indian surface owner and the BIA. The Superintendent furnishes such services as may be necessary to handle damage claims on restricted Indian lands.

Lessees or their authorized representatives have the right to use as much of the surface of the land within the Osage Mineral Estate as may be reasonable for operations and marketing, and the right-of-way for ingress and egress to any point of operations. If lessees and surface owners cannot agree on the routing of the items mentioned above, the route is established by the Superintendent. Before commencing a drilling operation, lessees must pay to surface owners commencement money in the amount of \$300 for each well, after which lessees are entitled to immediate possession of the drilling sites. Regulations state that a "drilling site shall be held to a minimum area essential for operations and shall not exceed one and one-half acres in area unless authorized by the Superintendent." Acceptance of commencement money on the part of a surface owner in no way affects his future right to damage compensation occasioned by the drilling and completion of the well for which it is paid.

Lessees may not drill wells within 300 feet of the boundary line of a leased parcel of land, nor may they locate a well or tank within 200 feet of any public highway, established watering place, or building used as a dwelling, granary or barn, except with the written permission of the Superintendent. No limits on well spacing within leases exist.

One use of property during drilling operations is the requirement for mud pits. These pits are leveled as soon as possible after completion of operations unless otherwise requested by the surface owner or user. Pits must be "constructed and maintained so as to prevent pollution of surface and subsurface fresh water," and they must be fenced off with at least four strands of barbed wire unless the surface owner, user or Superintendent gives consent otherwise. The pits also must be of adequate size to contain mud or deleterious substances extracted from wells, and must have sufficient storage to contain a supply of mud to be used in emergencies. No earthen pits, except those used for drilling, completion, recompletion, or workover of a well can be constructed, enlarged, reconstructed, or used without the approval of the Superintendent. Furthermore, unlined pits cannot be used for the continued storage of salt water or other deleterious substances; these substances must be placed in properly line receptacles and not be permitted to escape. Where existing facilities for disposal of such substances are inadequate the Superintendent gives instructions as to their disposal.

During drilling and other operations, lessees are required to keep accurate and complete records on all wells. These records must show the formations penetrated, the content and character of oil, gas, or water in each formation; and the kind, weight, size, landed depth, and cement record of casing used in drilling each well. Lessees are required to protect all freshwater zones from the surface downward: "Lessee shall, to the satisfaction of the Superintendent, take all proper precautions and measures to prevent damage or pollution of oil, gas, fresh water and other mineral bearing formations" (25 CFR 226.35).

#### Production

When completing an oil well (or several closely grounded wells) for production, several types of associated equipment area needed; access roads are maintained for producing wells. Tank batteries are setup for individual or grouped wells. Lessees must pay fees for tank sites (not to exceed 50 feet square) at the rate of \$40 per tank or other vessel. No fee is due for a tank temporarily set up for drilling, completing or testing a well. For tanks occupying more than 50 feet square, fees are agreed upon between surface owners and lessee or are fixed by arbitration.

Pipelines, electrical lines, and associated appliances also are a necessity for each set of wells and tank batteries. Lessees and surface owners must meet and agree to the routing of these lines and tank locations or the routes are set by the Superintendent. No fees are required for placement of the lines, but damages may be claimed for their installation.

Formation water is produced along with the oil. The water is generally high in dissolved salts, especially sodium chloride, and is usually disposed of by reinjecting it through nearby wells into the formation from which it is derived. The surface disposal of deleterious formation water in watercourses such as streams or freshwater ponds is prohibited. Reworking of old oil wells to increase production can include acid treating, redrilling, hydraulic fracturing, or otherwise improving well productivity. Reworking of wells is common in Osage County, but carrying out these operations requires approval of the Osage Agency. A workover permit application (Osage Form 139) must be completed and approved before the action is initiated.

Production royalties from oil, gas or combination oil/gas wells is one of the primary sources of income for the Osage Minerals Estate. The royalty on oil is generally 16 2/3 percent of the gross proceeds from sales after deducting the oil used for development and operation on the lease. In cases where oil production is more than 100 barrels per day on all wells within any one quarter section or portion thereof, the oil royalties are not less than 16 2/3 percent. With advanced recovery methods in use for additional oil recovery, a revised royalty rate of not less than 12.5 percent can be authorized by the Osage Minerals Council with the approval of the Superintendent. All gas royalty money is collected on the basis of not less than 16 2/3 percent of the market value per 1000 cubic feet. The Osage Minerals Council has also negotiated royalties in excess of 16 2/3 percent.

### Well Abandonment and Plugging Procedures

Both dry holes and old wells which are no longer economically productive must be plugged. Prior to abandonment, a plugging permit (Figure 8) is required from the Osage Agency. In all cases, lessees are required to plug and fill holes in a manner which confines a fluid (fresh water, oil, gas, salt water) to its own formation, and prevents the transmission of fluids between formations. Mud-laden fluid, cement, and other plugs must be used to fill each hole from bottom to top unless satisfactory agreements are reached between lessees and surface owner (subject to approval by the Superintendent). Within 10 days after plugging, lessees must file a complete report with the Superintendent regarding the plugging of each well. When any well is plugged as a dry hole or abandoned as a producer and plugged, the casing must be cut off three feet below ground level and lessees are allowed 90 days to clean up the area surrounding the well site to the satisfaction of the Superintendent. After all the above actions have taken place, surface owners can make claim to lessees for alleged damages, and all damages are settled in accordance with 25 CFR 226.

Each application for plugging must be accompanied by a fee of \$15. For failure to notify the Superintendent before plugging or abandoning any well, a fine of \$200 can be imposed. For failure to file plugging reports a fine of \$10 per day for each violation until compliance is met can be levied.

# Transportation and Transmission

In Osage County there are currently about 2,000 miles of paved highways which are maintained by district offices of the Oklahoma State Department of Transportation, Division of Highways. Several new roads are currently funded for pending construction. In addition, about 3,000 miles of oil company roads are maintained by lessee for day-to-day operations of their properties. Approximately 150 miles of unpaved gravel roads are constructed annually to carry out new oil and gas field operations.

In all, about 13,500 wells in the county are checked on a scheduled basis by oil field pumpers who normally make their rounds in pickup trucks. Workover units, drilling rig vehicles, cementing trucks, logging trucks, acidizing trucks and other vehicles also use the roads in drilling about 500 wells and reworking about 3,000 wells annually, Oil trucking firms also use the roads to deliver oil from tank batteries to gathering points or refineries. These companies presently truck about 6 percent of all oil produced in Osage County, and normally carry 160 to 200 barrels of oil per load. Most of the oil is presently trucked to Cushing and Tulsa, Oklahoma for refining or redistribution. Pipelines also run to these refining centers. The major mode of movement of gas, oil, formation water and secondary recovery chemicals is by pipeline.

Several major interstate pipelines cross Osage County. The inside diameters (ID) of the largest crude oil lines are 24" (ARCO). The largest natural gas lines are several Cities Service lines with 16' ID. Many interstate product lines also cross the county, with the majority of these converging at Barnsdall. The Osage Agency, the Osage Nation, nor the U.S. Department of Interior have any regulatory authority over interstate pipeline operations (including spill prevention or cleanup), unless those pipelines are located on restricted or trust Indian lands in Osage County. The Superintendent of the Osage Agency must approve route locations of interstate lines on restricted Indiana lands.

In addition to the major interstate lines, about 49 percent of all oil and essentially all of the natural gas is piped to tank batteries or gathering centers through lines ranging in size from 2" ID to 6" ID. It is estimated that several hundred miles of pipelines used for brine disposal or injection are presently in use in the county. The countywide total estimate (Osage Agency, 1978) for all major oil, gas, or saltwater lines used to deliver products to their proper location for sale or disposal is about 8,000 miles of pipelines. Approximately 150 to 200 miles of new pipelines are being installed annually (1978 rate) due to new oil and gas operations. This level of activity is not expected to change in the foreseeable future.

#### Safety and Environmental Controls

The oil and gas leasing program in Osage County is subject to numerous Federal and Osage Agency regulations which guard personal safety and environmental conditions. As in other parts of the country where oil and gas drilling and production are taking place, the rules of the Occupational Safety and Health Administration (OSHA, U.S. Department of Labor) are in effect in Osage County. These rules apply primarily to workers at industrial sites and include such protection as specifying hardhats in drilling areas, ear protection when working around machinery with high noise levels, and so forth.

The U.S. Environmental Protection Agency is the regulatory agency which is charged with enforcement of the Oil Spill Pollution Prevention regulations, 40 CFR, Part 112. These regulations were enacted to control oil spills with regard to non-transportation related onshore and offshore activities. The inspection process put forth in these regulations has been in effect in Osage County. Fresh water is further protected under Federal regulations of the Safe Drinking Water Act (1974, amended 1977) and the Clean Water Act (1972, amended 1977) which are administered by the Environmental Protection Agency.

To bring the BIA Osage Agency into conformity with the purposes, intent and procedures set forth in the National Environmental Policy Act (NEPA, 1969), a NEPA compliance process has been established to ensure that all Federal actions have complied with the guidance set forth in Title 43, Code of Federal Regulations (CFR), Part 46, Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, 59 Indian Affairs Manual 3-H, the BIA NEPA Guidebook.

It should be noted, however, that specific sections dealing with environmental protection have been incorporated into Osage Agency regulations since at least 1932. Regulations and permit requirements of the Osage Agency have therefore stressed safety and environmental protection since long before NEPA came into effect. The 1932 regulations, for example, included the following controls: when drilling in wildcat territory or known high pressure fields, a lessee must have an approved control device installed to protect against blowouts; all pollution is specifically prohibited with respect to surface water, mud pits and plugging (subsurface formations protected); and, with respect to surface operations and possible damage to streams, ponds, soil and vegetation, all salt water and other deleterious substances must be contained in appropriate receptacles and properly disposed.

Under current regulations, all well drilling, reworking and plugging must be accomplished in a manner that will prevent migration of oil, gas, saltwater, or other substance from one subsurface stratum to another, including any fresh-water-bearing formation. These requirements are specifically noted in the drilling permits and plugging permits which are issued by the Osage Agency. Since these permits came into effect much in advance of the effective date of the Oil Spill Pollution Prevention regulations (40 CFR, Part 112), it is obvious that management of the Osage Minerals Estate has been conscientiously working to maintain an unpolluted environment in Osage County for many decades.

In the event of accidents, fires, brine or oil spills, or other problems at well sites in Osage County, a lessee is required to file a report with the Osage Agency. If a surface landowner has a grievance as a result of any oil and gas activity, as soon as possible after the discovery of any damages, he must serve a written notice to the appropriate lessee or their representative. This notice must contain the nature and location of alleged damages, the date of occurrence, the names of the parties causing the damages, and the amount of damages. If arbitrated settlement cannot be made, action may be brought in court against the alleged party causing the damages.

The Osage Agency can levy fines on lessee or operators for not properly adhering to environmental regulations. For failure to construct and maintain mud pits as required, a fine of

\$10 per day of operations after commencement can be levied on any well until compliance is met. For failure to have a proper valve or other blowout control device installed at each drilling, a fine of \$100 can be levied. For failure to properly care for and dispose of sludge, saltwater or other deleterious substance, a fine of \$100 per day can be levied and, in the event of failure to comply within 5 days, a fine of \$500 per day can be levied until compliance is met.

# Appendix B Air Quality Information

### Appendix B

### **AIR QUALITY**

### Typical Air Emissions from Oil Field Development

According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Typical processes that occur during exploration and production include the following.

- Combustion emissions include SO<sub>2</sub>, ozone precursors called volatile organic compounds (VOCs), GHGs, and hazardous air pollutants (HAPs). Sources include engine exhaust, dehydrators, and flaring (EPA 1999).
- Fugitive emissions include criteria pollutants, H<sub>2</sub>S, VOCs, HAPs, and GHGs. Sources of fugitive emissions include mechanical leaks from well field equipment such as valves, flanges, and connectors that may occur in heaters/treaters, separators, pipelines, well heads, and pump stations. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Other sources of fugitive emissions include evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity) (EPA 1999).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents (EPA 1999).

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust; wind-blown dust from disturbed areas and travel on dirt roads; evaporation from pits and sumps; and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program (EPA 2012c). This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and secondly manufacturers must produce progressively lower engine emissions.

# Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide (CO<sub>2</sub>) occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2012c) identifies the principal GHGs that enter the atmosphere because of human activities as the following.

- CO<sub>2</sub>: CO<sub>2</sub> enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO<sub>2</sub> is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- Methane (CH<sub>4</sub>): CH<sub>4</sub> is emitted during the production and transport of coal, natural gas, and oil. CH<sub>4</sub> emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

- Nitrous Oxide (N<sub>2</sub>O): N<sub>2</sub>O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Fluorinated Gases: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2012b).

CO<sub>2</sub> is the primary GHG, responsible for approximately 90% of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]) (EPA 2012b). To simplify discussion of the various GHGs, the term "Equivalent CO<sub>2</sub> or CO<sub>2</sub>e" has been developed. CO<sub>2</sub>e is the amount of CO<sub>2</sub> that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, one ton of CH<sub>4</sub> has a CO<sub>2</sub>e of 22 tons; therefore, 22 tons of CO<sub>2</sub> would cause the same level of radiative forcing as one ton of CH<sub>4</sub>. N<sub>2</sub>O has a CO<sub>2</sub>e value of 310. Thus, control strategies often focus on the gases with the highest CO<sub>2</sub>e value.

According to the Pew Center, "Over the past 50 years, the (worldwide) data on extreme temperatures have shown similar trends of rising temperatures: cold days, cold nights, and frosts occurred less frequently over time, while hot days, hot nights, and heat waves occurred more frequently" (Pew Center 2009). Generally, the earth's temperature has increased about one degree Celsius since 1850 but some areas have seen an increase of four degrees. Sea levels are also rising, mountain glaciers are disappearing, and ocean currents, such as the Gulf Stream, are slowing (Intergovernmental Panel on Climate Change [IPCC] 2007).

Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. The IPCC Working Group I Fourth Assessment compiles and analyzes global data on climate change, and reports that warming of the climate system is evident from global observations of increases in average air and ocean temperatures, widespread melting of snow and ice, and rising average sea levels (IPCC 2007). Globally, 11 of the 12 years between 1995 and 2007 ranked among the warmest years in the instrumental record of global surface temperature since 1850 (IPCC 2007). The National Oceanic and Atmospheric Agency monitoring data indicated that 21 of the 30 years between 1979 and 2009 had above average temperatures in the contiguous United States, with departures from average temperatures occurring with increasing frequency, as shown in Figure Error! No text of specified style in document.-1 (National Oceanic and Atmospheric Agency 2010).

Many physical and biological effects have been observed to correlate with trends in global warming. Sea levels are rising worldwide and along much of the United States coast (EPA 2013a). Tide gauge measurements and satellite altimetry suggest that sea levels have risen worldwide approximately 4.8 to 8.8 inches during the last century (IPCC 2007). A significant amount of sea level rise has likely resulted from the observed warming of the atmosphere and the oceans. Hydrological systems, ice pack, and permafrost are also affected by higher oceanic and atmospheric temperatures, affecting biological systems and agriculture (IPCC 2007).

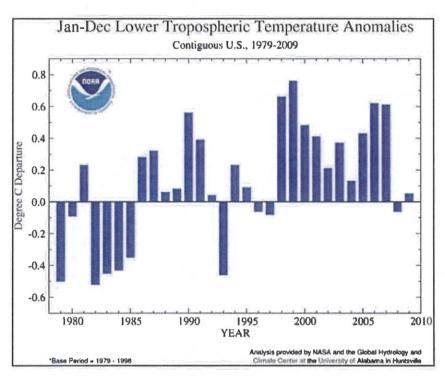


Figure Error! No text of specified style in document.-1. Temperature anomalies in the contiguous United States, 1979-2009.

IPCC experts concluded that most of the observed increase in globally averaged temperature since the mid-twentieth century is very likely due to the observed increase in anthropogenic GHG concentrations (IPCC 2007). Therefore, the EPA collects data on and encourages limiting or reducing emissions of anthropogenic sources of GHGs to the earth's atmosphere (EPA 2012b). Many U.S. states have adopted goals and actions to reduce GHGs. The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards would equal 35 miles per gallon by 2020, with an estimated savings to drivers of \$100 billion annually (EPA 2012c).

Energy production and supply was estimated to emit up to 25.9% of GHGs world-wide in 2004 (Pew Center 2009). CH<sub>4</sub>, with a high radiative forcing CO<sub>2</sub> ratio, is a common fugitive gas emission in oil and gas fields (EPA 2012b). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA, and are not the subject of any current federal proposals that would regulate GHG emissions.

#### Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near the emission source. HAPs are regulated separately from criteria air pollutants. There are several hundred HAPs recognized by the EPA and State of Oklahoma. Health effects of HAPs may occur at exceptionally low levels; for many HAPs, it is not possible to identify exposure levels that do *not* produce adverse health effects. Major sources of toxic air contaminants include industrial

processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

# Appendix C U.S. Census Bureau Information

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State & County QuickFacts

# Osage County, Oklahoma

People QuickFacts	Osage County	Oklahoma
Population, 2013 estimate	47,987	3,850,568
Population, 2010 (April 1) estimates base	47,480	3,751,357
Population, percent change, April 1, 2010 to July 1, 2013	1.1%	2.6%
Population, 2010	47,472	3,751,351
Persons under 5 years, percent, 2013	5.4%	6.9%
Persons under 18 years, percent, 2013	23.2%	24.6%
Persons 65 years and over, percent, 2013	17.8%	14.3%
Female persons, percent, 2013	49.7%	50.5%
White alone, percent, 2013 (a)	66.3%	75.4%
Black or African American alone, percent, 2013 (a)	11.5%	7.7%
American Indian and Alaska Native alone, percent, 2013 (a)	14.7%	9.0%
Asian alone, percent, 2013 (a)	0.4%	2.0%
Native Hawaiian and Other Pacific Islander alone, percent,		
2013 (a)	Z	0.2%
Two or More Races, percent, 2013	7.2%	5.8%
Hispanic or Latino, percent, 2013 (b)	3.3%	9.6%
White alone, not Hispanic or Latino, percent, 2013	64.1%	67.5%
Living in same house 1 year & over, percent, 2009-2013	89.2%	82.5%
Foreign born persons, percent, 2009-2013	1.2%	5.5%
Language other than English spoken at home, pct age 5+,		
2009-2013	3.4%	9.4%
High school graduate or higher, percent of persons age 25+, 2009-2013	87.6%	86.4%
Bachelor's degree or higher, percent of persons age 25+,		
2009-2013	16.1%	23.5%
Veterans, 2009-2013	4,085	312,492
Mean travel time to work (minutes), workers age 16+, 2009- 2013	24.0	21.0
Housing units, 2013	21,262	1,682,256
Homeownership rate, 2009-2013	79.0%	67.1%
Housing units in multi-unit structures, percent, 2009-2013	6.3%	15.2%
Median value of owner-occupied housing units, 2009-2013	\$93,900	\$112,80
Households, 2009-2013	18,512	1,444,08
Persons per household, 2009-2013	2.50	2.5
Per capita money income in past 12 months (2013 dollars),		
2009-2013	\$22,353	\$24,20
Median household income, 2009-2013	\$44,195	\$45,33
Persons below poverty level, percent, 2009-2013	14.5%	16.9%
Business QuickFacts	Osage County	Oklahoma
Private nonfarm establishments, 2012	580	90,954
Private nonfarm employment, 2012	5,983	1,305,183
		3.5%
Drivete manfarm ampleyment paraget change 2011 2012	2.7%	
Private nonfarm employment, percent change, 2011-2012	2,892	266,58
Nonemployer establishments, 2012		
	4,157	333,79
Nonemployer establishments, 2012		
Nonemployer establishments, 2012  Total number of firms, 2007  Black-owned firms, percent, 2007  American Indian- and Alaska Native-owned firms, percent,	4,157 5.9%	3.19
Nonemployer establishments, 2012  Total number of firms, 2007  Black-owned firms, percent, 2007  American Indian- and Alaska Native-owned firms, percent, 2007	4,157 5.9% 12.1%	3.1% 6.3%
Nonemployer establishments, 2012  Total number of firms, 2007  Black-owned firms, percent, 2007  American Indian- and Alaska Native-owned firms, percent,	4,157 5.9%	333,79 3.19 6.39 2.09

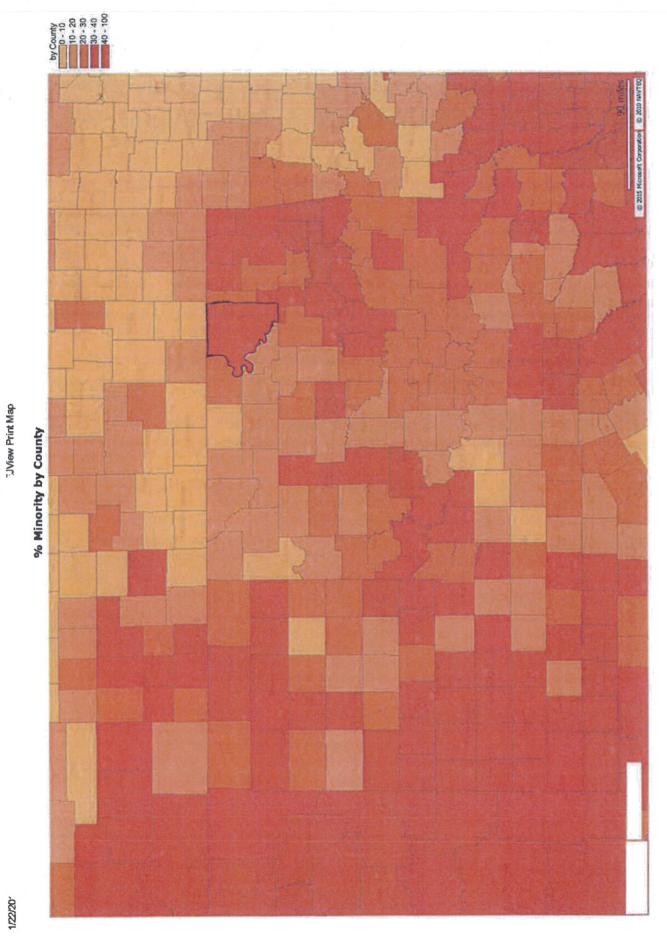
Women-owned firms, percent, 2007	S	25.3%
Manufacturers shipments, 2007 (\$1000)	01	60,681,358
Merchant wholesaler sales, 2007 (\$1000)	D	48,074,682
Retail sales, 2007 (\$1000)	172,087	43,095,353
Retail sales per capita, 2007	\$3,801	\$11,931
Accommodation and food services sales, 2007 (\$1000)	18,150	5,106,585
Building permits, 2012	118	11,930
Geography QuickFacts	Osage County	Oklahoma
Land area in square miles, 2010	2,246.36	68,594.92
Persons per square mile, 2010	21.1	54.7
FIPS Code	113	40
Metropolitan or Micropolitan Statistical Area	Tulsa, OK Metro Area	

Counties with 500 employees or less are excluded.
 Includes data not distributed by county.

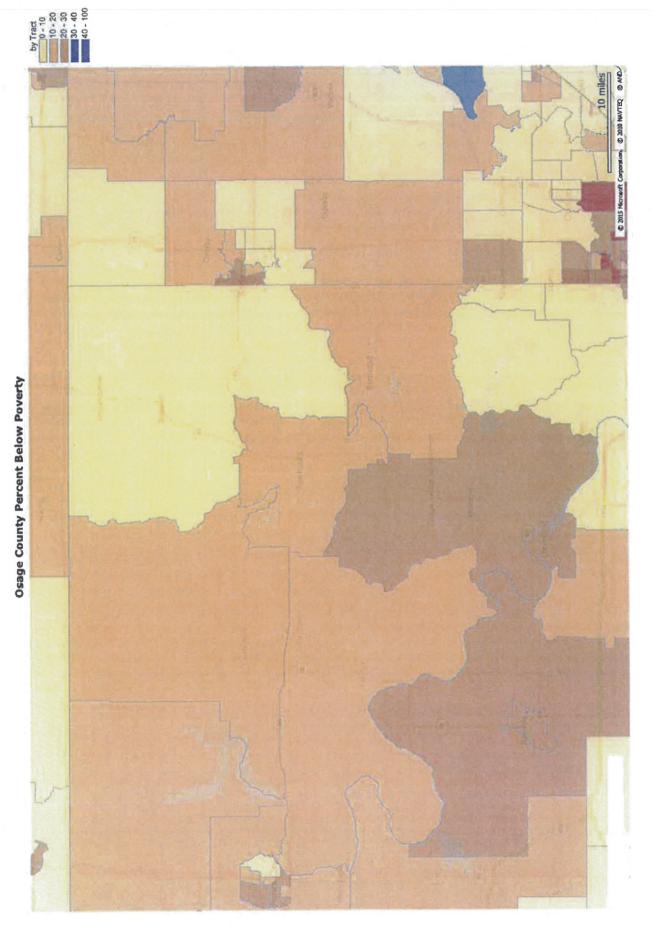
Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits Last Revised: Thursday, 04-Dec-2014 15:04:44 EST

<sup>(</sup>a) Includes persons reporting only one race.(b) Hispanics may be of any race, so also are included in applicable race categories.

D: Suppressed to avoid disclosure of confidential information F: Fewer than 25 firms
FN: Footnote on this item for this area in place of data
NA: Not available
S: Suppressed; does not meet publication standards
X: Not applicable
Z: Value greater than zero but less than half unit of measure shown







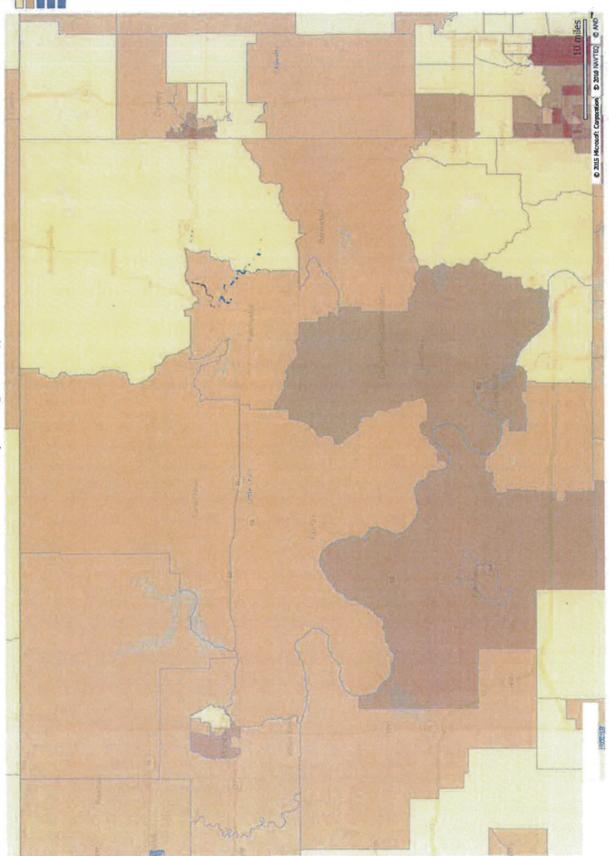
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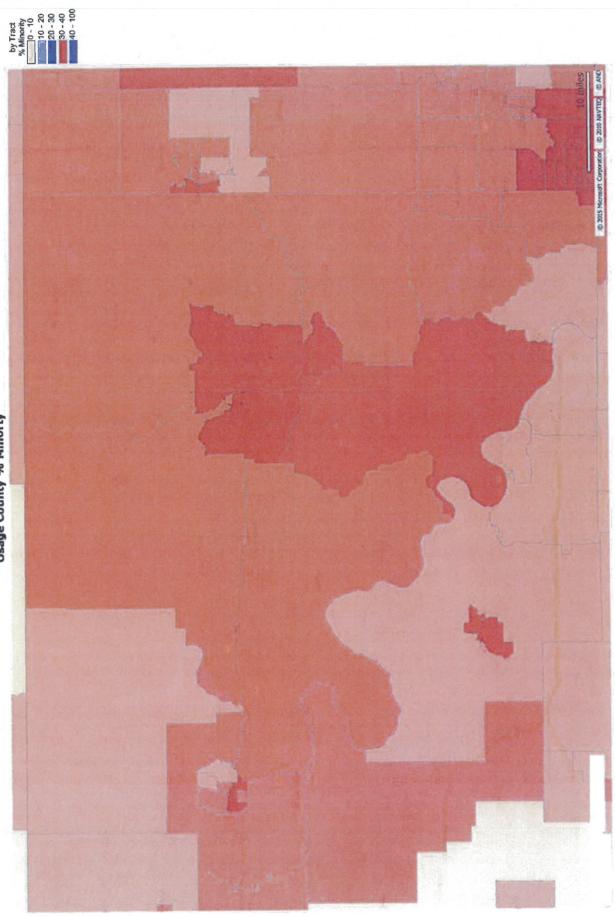


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### Appendix D

Best Management Practices - Attachment A to Form 139

### ATTACHMENT A - Osage Form No. 139

The following forms must be kept at the project site at all times during the workover operation(s): (1) the Osage Agency Form No. 139, (2) Attachment A for Osage Form No. 139 which identifies all of the conditions of approval of workover operations in Osage County (listed below), and (3) the Workover Review form which will be provided to the Lessee/Operator upon confirmation of approval by the Agency.

### **General Requirements**

All lessees must comply with the requirements of 25 CFR 226, including but not limited to:

- § 226.22 Prohibition of Pollution.
- § 226.19 Use of Surface Lands Lessee must conduct operations in a workmanlike manner, commit no waste and not create any unavoidable nuisance on the premises under his/her control.

Workover operations must be contained to the historic well pad in order to minimize impacts to the affected environment. This must be documented through the submission to the Osage Agency of photographs taken before the proposed activities commence and after activities have ceased.

For each workover operation a minimum of seven (7) dated photographs must be submitted as supporting documentation with the Form 139 in order to depict the existing condition of the well pad and existing facilities as described below.

- 1 photo of the well sign
- 1 photo of the well head (well bore/pumping unit location
- 1 photo of the lease road, showing ingress and egress to the proposed workover location
- 4 photos taken in the following manner: stand at the center of the well pad and take 1 photo facing each direction (North, East, South and West)

All lessees must comply with, and obtain any necessary permits or authorizations required under the federal Clean Water Act, Clean Air Act, Safe Drinking Water Act, Endangered Species Act and other applicable federal laws.

In addition, the following standard BIA Osage Agency Best Management Practices (BMPs), known as "Attachment A", shall apply, unless the Superintendent has given prior written approval of either 1) an exemption to a specific standard BIA Osage Agency BMP, and 2) an equivalent set of BMPs developed by the Lessee and incorporated as conditions of approval for the workover operation.

### ATTACHMENT A - Osage Form No. 139

### Standard BMPs

The following BMPs shall be followed by lessees, their agents, operators, and contractors:

- 1. Avoid impacts to National Register-eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, stop work immediately, secure the affected site, and notify the BIA and Tribal Historic Preservation Officer. In the event of a discovery, work in that area shall halt and not resume until written authorization to proceed has been received from the BIA. All surface disturbances must be kept within the confines of the historic well pad described in the permit application package. Expansion or relocation of the well pads, access roads, or other implementation of additional activities outside of the permitted area is prohibited unless an appropriate cultural resources survey has been submitted and determined adequate, approved by the BIA Osage Agency and all appropriate permits have been obtained.
- 2. Avoid or minimize soil and vegetation disturbance. Avoid removal of or damage to trees, shrubs, and groundcover to the extent possible. Avoid or minimize alteration of the natural topography, and limit activities on steep slopes.
- 3. Erosion control measures are required for the duration of all implementation phases of the proposed project. Erosion control measures must effectively minimize the movement of soil, debris or contaminants from the project site to adjacent lands and waterways.
- 4. All vehicles and equipment must utilize and stay confined to existing roads described in the approved EA. These roads must be maintained and upgraded as needed according to BIA direction and agreements between the operator and surface owners.
- 5. Tank batteries must have a Spill Prevention and Control and Countermeasure Plan (SPCC) in compliance with EPA Regulations under 40 CFR Part 112. A fluid impermeable secondary containment dike/berm must be constructed around any tank battery and facilities according to 40 CFR 112.7. The dike/berm and entire containment area must be graveled. No water collected within the secondary containment shall be discharged. In accordance with the SPCC plan and the BIA regulations, the Lessee will immediately notify the BIA of all spill incidents.
- 6. No venting or flaring of gas is allowed unless prior written approval of the BIA Osage Agency Superintendent has been obtained.

### ATTACHMENT A - Osage Form No. 139

- 7. Store and label chemicals properly (including secondary containment). Do not store equipment or chemicals onsite if they are not being used on site. Do not leave open containers of chemicals or wastes on site.
- 8. Keep sites clean and free of any litter, trash, old equipment, contaminated soil or unused containers. Promptly dispose of any wastes at appropriate recycling facility, approved landfill or other approved location. Remove any unused equipment not necessary to the operation of the lease after drilling activities have been completed.
- 9. All production equipment, facilities and tanks including well-head and above-ground piping/equipment shall be properly enclosed to exclude livestock if present.
- 10. All pits (including tank batteries contained within a dike/berm) must be enclosed with a fence of at least four strands of barbed wire, or approved substitute. All earthen pits to be used for storage of salt water or other deleterious substances must be lined with an impermeable layer to prevent contamination of soils and groundwater. Temporary pits must be filled and leveled immediately upon completion of the activity.
- 11. To the extent possible, minimize disturbance to land owners, wildlife, and natural resources due to noise, excessive traffic, dust or other impacts associated with operations.
- 12. Do not conduct activities within stream channels or wetlands without proper authorization, and avoid any discharge of soil or contaminants or removal of stream water that could result in a violation of applicable federally-approved water quality standards.
- 13. Restore disturbed areas by re-establishing vegetation using seed, sod or other approved method, and add clean soil to disturbed areas if necessary. Restore with native species unless otherwise directed by the surface owner in writing and approved by the BIA. No noxious or invasive species may be used in revegetation and reclamation activities.
- 14. Upon conclusion of workover operations all areas of the surface disturbance (i.e. well pad, access road, pipeline, etc.) shall be promptly reclaimed as described in the permit and approved Programmatic EA for workover operations. After a well is no longer in production, reclamation of the site will begin promptly. Reclamation shall be completed not later than ninety (90) days from rig removal, well abandonment, conclusion of workover operations or final plugging of a well, unless otherwise approved by the BIA.
- 15. The lessee shall conduct activities in a manner that avoids any potential incidental take or harm to federally-listed threatened and endangered species, or in a manner that complies with any permit or authorization issued by the U.S. Fish and Wildlife Service (USFWS).

### ATTACHMENT A - Osage Form No. 139

Lessee must follow guidance in the USFWS "Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil and Gas Projects (April 2014), found at the following website: <a href="http://www.fws.gov/southwest/es/oklahoma/documents/abb/abb\_icp/migbird%20">http://www.fws.gov/southwest/es/oklahoma/documents/abb/abb\_icp/migbird%20</a> and %20 eagle %20 avoidance %20 measures %20 april 2014. pdf

- Lessee must follow USFWS established protocol regarding areas where the American burying beetle (ABB) is known or suspected to exist. See <a href="http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm">http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm</a>. If proposed operations require the construction of a drilling pit or other excavation activity by heavy equipment, then the lessee must ensure that suitable habitat for the ABB does not exist. If proposed operations will impact suitable habitat for the ABB, it will be the responsibility of the lessee to obtain authorization from the USFWS to proceed with that portion of the project.
- 17. Approval must be obtained from the Environmental Protection Agency prior to the commencement of workover operations related to underground injection, construction or conversion of saltwater injection/disposal wells.

### Appendix E Endangered Species Act Information



### United States Department of the Interior

### FISH AND WILDLIFE SERVICE Oklahoma Ecological Services Field Office 9014 EAST 21ST STREET TULSA, OK 74129

PHONE: (918)581-7458 FAX: (918)581-7467 URL: www.fws.gov/southwest/es/Oklahoma/



February 27, 2015

Consultation Code: 02EKOK00-2015-SLI-0689

Event Code: 02EKOK00-2015-E-00766
Project Name: Programmatic Work-Over EA

Subject: List of threatened and endangered species that may occur in your proposed project

location, and/or may be affected by your proposed project

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

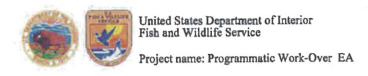
Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle\_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process <a href="http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm">http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm</a>.

Attachment



### Official Species List

### Provided by:

Oklahoma Ecological Services Field Office 9014 EAST 21ST STREET TULSA, OK 74129 (918) 581-7458 http://www.fws.gov/southwest/es/Oklahoma/

Consultation Code: 02EKOK00-2015-SLI-0689

Event Code: 02EKOK00-2015-E-00766

Project Type: Oil Or Gas

Project Name: Programmatic Work-Over EA

Project Description: Programmatic Work-Over Environmental Assessment for Osage County, OK

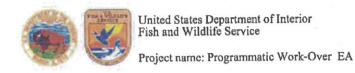
Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.



United States Department of Interior Fish and Wildlife Service

Project name: Programmatic Work-Over EA

Project Counties: Osage, OK



### **Endangered Species Act Species List**

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the Has Critical Habitat column may or may not lie within your project area. See the Critical habitats within your project area section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern <i>(Sterna antillarum)</i> Population: interior pop.	Endangered		
Piping Plover (Charadrius melodus)  Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot (Calidris canutus rufa)	Threatened		
Whooping crane (Grus americana) Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket (Lampsilis rafinesqueana)	Endangered	Proposed	
Insects			
American Burying beetle (Nicrophorus americanus) Population: Entire	Endangered		
Rattlesnake-Master Borer moth (Papaipema eryngii)	Candidate		





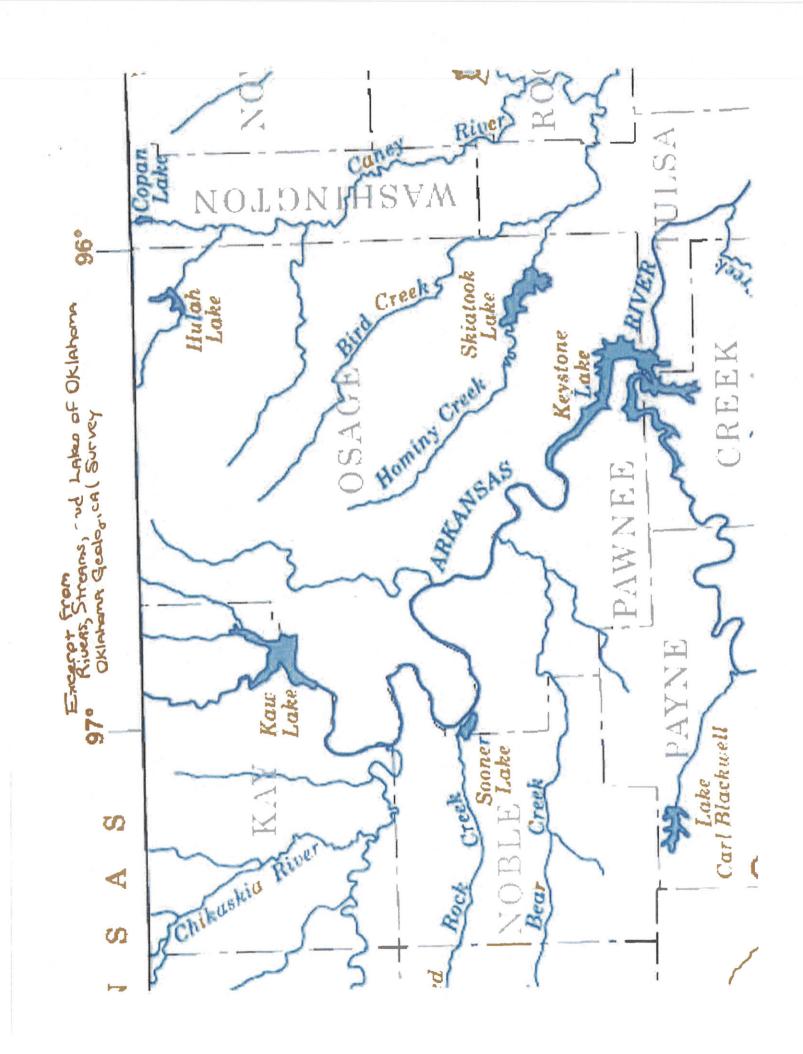
United States Department of Interior Fish and Wildlife Service

Project name: Programmatic Work-Over EA

### Critical habitats that lie within your project area

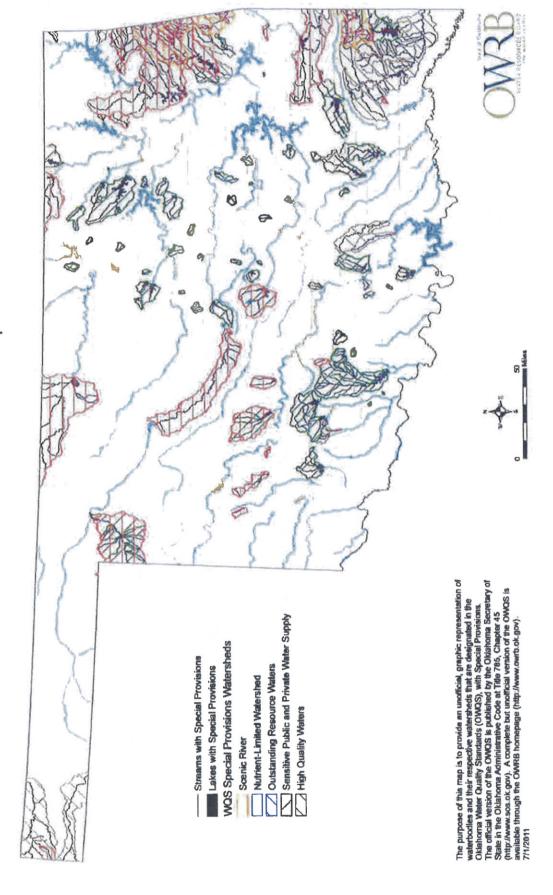
There are no critical habitats within your project area.

### Appendix F Water Resources Information



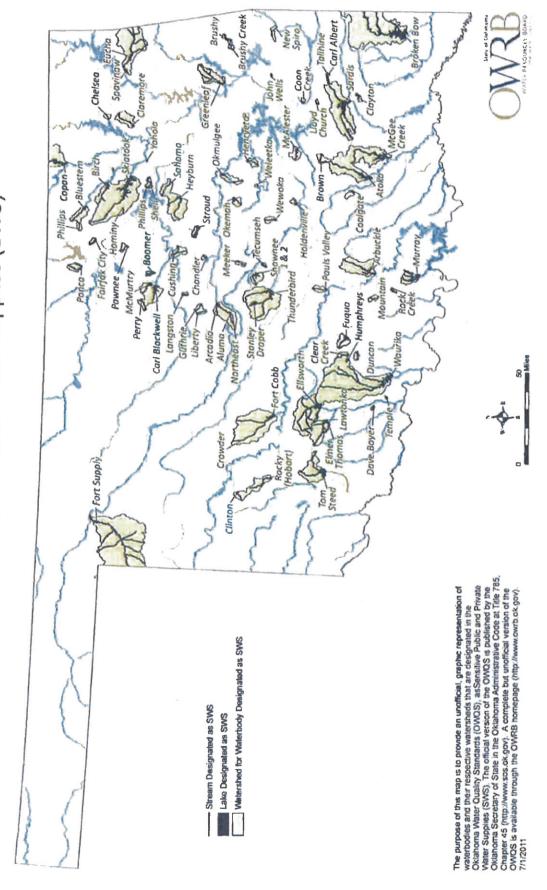
## Oklahoma Water Quality Standards

# Waterbodies and Watersheds with Special Provisions

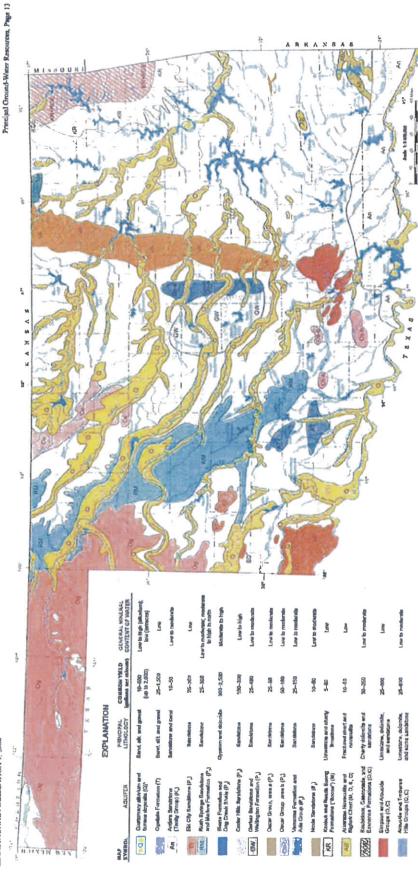


## Oklahoma Water Quality Standards

# Sensitive Public and Private Water Supplies (SWS)



20-12 303d list Osage Impaire. Jaters



### PRINCIPAL GROUND-WATER RESOURCES OF OKLAHOMA Kenneth S. Johnson, Oklahoma Geological Survey

these equitions yield 25-300 gallenin, although some wellt yield as much ma 600-2,300 gallenin Water in receit best-coc aquities that loss to modernic misroel content, about 300-1,300 milliparant per liker dissolved solding Coronal valent et also persent in Quientary allin tima and termon deposition to according to a single persent in Quientary allin tima and termon deposition to the contest mainly of unconfoldant tarki, all, cliey, and general. "Al-In num reters to extinents to present-day prosess character of float plans, wherear between deposits refer to delocal plans and test ment as a series expenses to the plans and extinent shows the present-day flood plans) after a return structur to upon or coast a decise charact. After une and territor deposits are among the most record published deposits, after the top of the between the whore the two are mapped logisters. The tenches of Quantumy deposits and plans to the transport of the transport of the plans of the transport of the transport of the transport of the plans of the transport of the plans of the transport of the plans of the plans of the transport of the plans of the plans of the transport of the plans of the plans of the transport of the plans of Larquatin water, and that is sufficiently permetable to yield super trans-ueit's a last system water. By a form (gleister, per mentals et a) yield super trans-tice thresholms of the remercial aquificient to Oblamera, and was modified. From Machine (1975), Markethe and Billion (1975), Market (1974), Billingham, and Monte (1975), Care and Bergman (1970), Herres (1977), Billingham and Bargman (1970). Manten (1981), Machine and Bergman (1982), and John-Bothook aquiforn in Oktaboma course of saccious, sand, lineatone, oloselet, grysum, of theclare for require and deat. Adultet beforested unage from 100 fit to several thousand-feet Depth so fresh water engage from a feet week more than 1,000 fit most wells are 100-4100 fl deep, Wells in An aquater cumpyre of mocks and sedimonts naturated with goods to

deposite yield 10-500 galfmin of water (locally several thousand galfmin); matt of this ground water has less than 1,000 milligname per liter dissolved

percolating downward to the visite table rectinges the aquite community.

The ventual or horsensial store of ground-winter flow in the aquifers principly ranges from 5 to 1810 to 1925, 2431, and preserving bookings and to develope, con-distorts, seek set for exercition or lightly function flowers to the contrades or the principle of the most than 1 (1800 ft perc) was From water stoned in Oklaborna equificra neutles from the downward mot-terrent of meteoric (procipitation) and surface vestors that error each squafer at its rechange zero. Frech water may displace saline water that cup-nally may have occupied parts of the aquafer. The system et dy narract water

Large meas of Olishoma, about accelered on the map, are undertain monthly to have or other (own-percentable) rocks that typically yield only onestally made it manachid are stabus 1-5 galwant Highly mineralized (saline) water until for most uses, a process beautial for the interprise of teather) water with for most uses, a process beautial forth-water store in these made. In the control forth-water aguinery. The depth to this top of this saline water roughs from less than 100 it in some places, on to 3,000 it mile Arthordy's Monthers.

The Oblishoms Whate Rennernes Board (1990) entimated that Oldsho-ms is premajust aquifect accounts 300 relation activ-feet of feeth waters, portuge half of wholes is reconverable for beneficial act. Wellsh and springs repeting those equifers currently supply more than 67% of the water used in Okia-bonas, chally in the rent when yourface-water is less advantant.